star

LS-5 EX
LS-5 TT

OPERATIONS MANUAL

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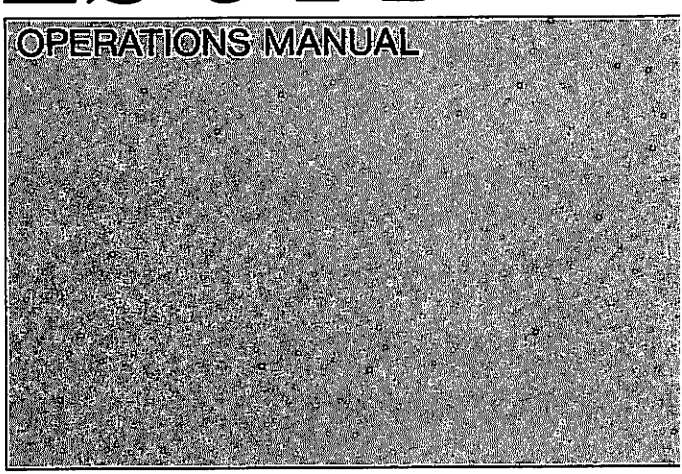
LS-5 EX
LS-5 TT



Safety Notices

This printer is certified as a Class 1 laser product under the U.S.Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. This means that the printer does not emit hazardous laser radiation.

Since radiation emitted inside the printer is completely confined within protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

The Center for Devices and Radiological Health (CDRH) of the U.S.Food and Drug Administration implemented regulations for laser products on August 1, 1976. These regulations apply to laser products marketed in the United States. The label on the printer indicates compliance with the CDRH regulations and must be attached to laser products marketed in the United States.

Caution-use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Federal Communications Commission
Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For compliance with the Federal Noise Interference Standard, this equipment requires a shielded cable.

The above statements apply only to printers marketed in the U.S.A.

VDE Statement

This device carries the VDE RFI protection mark to certify that it meets the radio interference requirements of the Postal Ordinance No. 243/1991. The additional marking "Vfg. 243/P" expresses in short form that this is a peripheral device (not operable alone) which only individually meets the Class B RFI requirements in accordance with the DIN VDE 0878 part 3/11.89 and the Postal Ordinance 243/1991.

If this device is operated in conjunction with other devices within a set-up, in order to take advantage of a "General (Operating) Authorization" in accordance with the Postal Ordinance 243/1991, the complete set-up must comply with the Class B limits in accordance with the DIN VDE 0878 part 3/11.89, as well as satisfy the preconditions in accordance with § 2 and the prerequisites in accordance with § 3 of the Postal Ordinance 243/1991.

As a rule, this is only fulfilled when the device is operated in a set-up which has been type-tested and provided with a VDE RFI protection mark with the additional marking "Vfg 243".

Machine Noise Information Ordinance 3. GSGV, January 18, 1991: The sound pressure level at the operator position is equal or less than 70 dB(A) according to ISO 7779.

The above statement applies only to printers marketed in Germany.

Statement of
The Canadian Department of Communications
Radio Interference Regulations

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émen pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

The above statement applies only to printers marketed in Canada.

Safety Notices for Finland

Tämä Kirjoitin LUOKAN 1 LASERLAITE.

VAROITUS! Laitteen käyttäminen muulla kuin tässä käyttöohjeessa mainitulla tavalla saattaa altistaa käyttäjän turvallallisuusluokan 1 ylittävälle näkymättömälle lasersäteilylle.

DENNA SKRIVARE ÄR EN KLASS 1 LASERAPPARAT.

VARNING! Om apparaten används på annat sätt än i denna bruksanvisning specificerats, kan användaren utsättas för osynlig laserstrålning, som överskrider gränsen för laseklass 1.

The above statement applies only to printers marketed in Finland.

Trademark Acknowledgements

LS-5EX, LS-5TT, EP-40XA: Star Micronics Co., Ltd.

HP LaserJet III, PCL, GL/2: Hewlett Packard Company

LaserWriter NTX, AppleTalk: Apple Computer, Inc.

PostScript: Adobe Systems, Inc.

TrueImage, TrueType: Microsoft Corporation

IntelliFont: Agfa Corporation

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- All efforts have been made to ensure the accuracy of the contents of this manual at the time of press. However, should any errors be detected, STAR would greatly appreciate being informed of them.
- The above notwithstanding, STAR can assume no responsibility for any errors in this manual.

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How to Use This Manual

CHAPTER 1

Congratulations on purchasing a Star LS-5 Series Laser Printer. You will be delighted with the quality of the printed images and the ease of operation. With your computer, software and this printer, you can create professional-looking documents.

This Operations Manual explores the entire range of printing possibilities of the Star LS-5 Series Printer. This manual is for beginners and for those who plan to concentrate on the basics.

Advanced users and those interested in programming may want to purchase our optional Applications Manual. For details, please contact your dealer.

Chapter 2 begins with an overview of the manual and of the Star Laser printer. This chapter explains how to unpack your new printer and prepare it for initial operation. Chapter 3 explains how to operate the printer's control panel and display screen.

Some people like to skip the preliminary explanations and begin using the printer immediately. Chapter 4 provides the information for a quick start. If you begin with Chapter 4, you should read the rest of the manual in sequence, at some later time, for a complete picture of your printer and its operations.

Chapter 5 describes the font and typeface characteristics that will enable you to give your printed page that professional look.

The Star LS-5EX emulates the operation of the HP LaserJet Ⅲ, and the Star LS-5TT emulates the operation of the Apple LaserWriter NTX and the HP LaserJet Ⅲ.

With this capability, the Star LS-5 Series Printer will operate with a wide range of software that is available on the market.

Chapters 6 and 7 describe the maintenance and troubleshooting operations to keep your Star LS-5 Series Printer working in "perfect" condition.

Chapter 8 describes the optional accessories which you can select with the Star LS-5 Series Laser Printer.

FOR APPLICATIONS MANUAL £49.

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1.1 LASER PRINTING

Before you begin learning about your new Star LS-5 Series Laser Printer, you may find it helpful to know something about laser printing itself.

A laser is actually a beam of light of just one wavelength (Laser is an acronym for Light Amplification by Stimulated Emission of Radiation). This "highly coherent" beam of light can be focused very sharply. Lasers, generated by gases, liquids or semiconductors, are widely used in applications ranging from surgery to the visual arts.

Laser printing is a process that uses a laser beam — in this case, generated by a semiconductor — to activate portions of an electrically charged surface. These activated parts represents the words, numbers, or graphics being sent from the computer for printing. Other parts of the printer transfer this image to paper, then clean the surface and prepare it to receive more information to be printed.

In other words, this process is a type of laser-activated temporary engraving.

The Star LS-5 Series Laser Printer consists of two interconnected assemblies — the toner cartridge and the printer body.

The toner cartridge contains the drum, which is the rotating surface. In the darkness of the toner cartridge, the drum holds a negative charge placed on it by the primary corona wire in the printer. Shutters on the bottom of the toner cartridge assure that no unwanted light penetrates its interior.

When text or graphics are sent by the computer to the printer, a laser beam is generated by a semiconductor laser diode. This beam is focused by special scanning mirrors that turn the light beam into a tool that "writes" or "paints" on the surface of the drum. The area of the drum touched by the laser beam loses its negative charge and contains a reverse image of the information sent from the computer. As the drum rotates, it passes a developer unit that is also rotating, but in the opposite direction. The surface of the developer unit is covered with toner ("ink") which has a negative charge. The neutralized portions of the drum, containing the information to be printed, picks up negatively charged toner from the developer unit.

At this point, paper fed from the paper cassette moves through the transfer unit, there it receives a positive charge. As the drum rotates, the negatively charged particles of toner are attached to the positively charged surface of the paper.

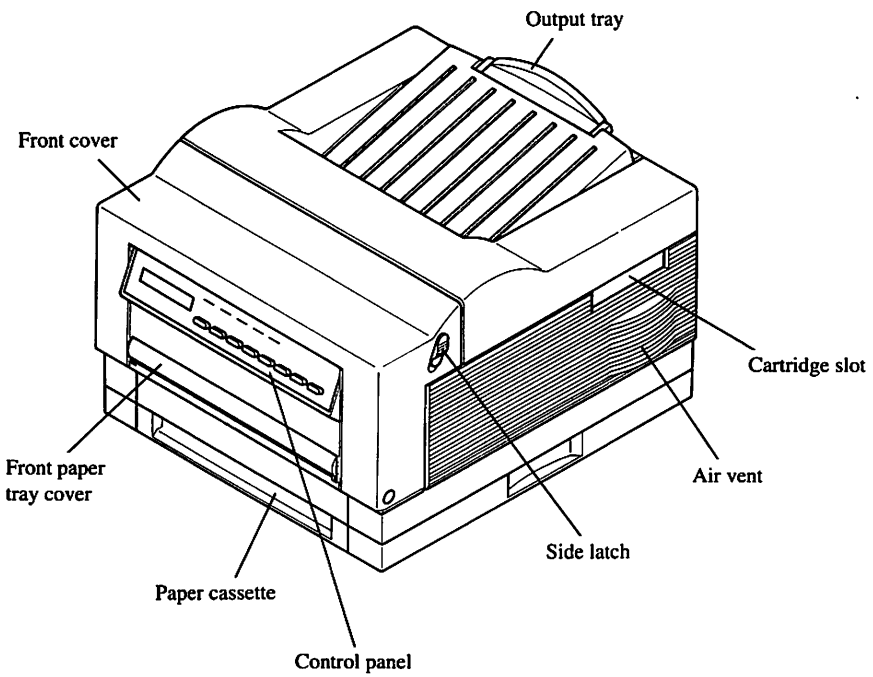
A combination of heat and pressure fuse the image to the paper. The paper is then ejected from the printer.

Finally, a cleaning mechanism in the toner cartridge removes excess toner from the drum, and a special light beam neutralizes its entire surface. Then the entire process can begin again.

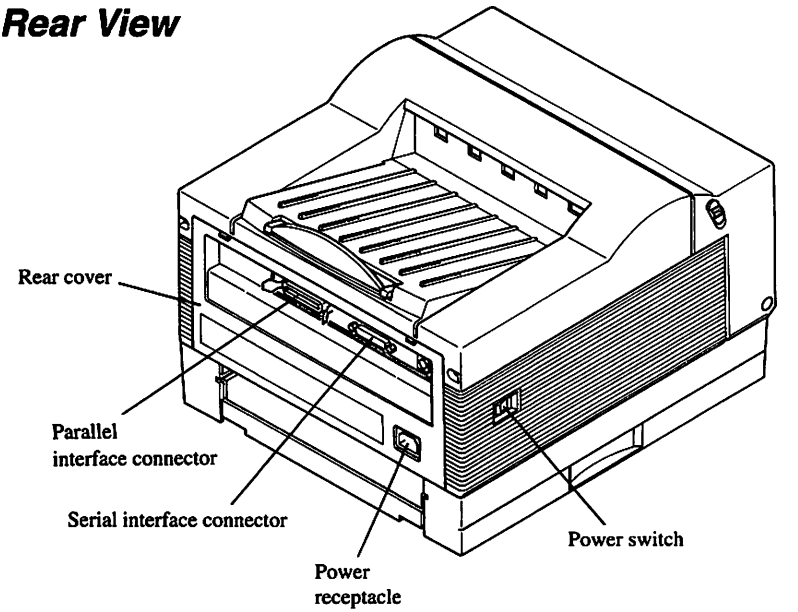
1.2 PRINTER COMPONENTS

You will learn about all aspects of your Star LS-5 Series Printer as you read this manual, but a brief introduction is in order. The following figures show the front, rear and inside views of the printer.

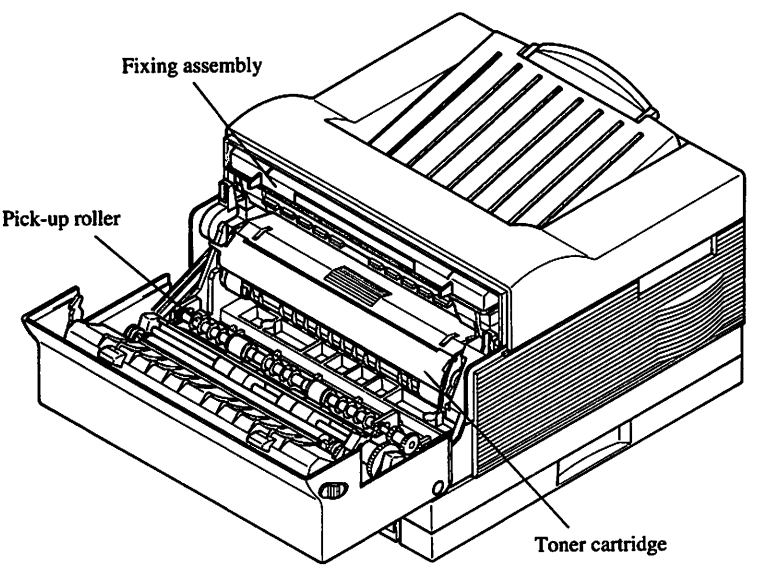
Front View



Rear View



Inside View



1.3 PRINTER FEATURES

The Star LS-5 Series Laser Printer is a highly compact, fast and high-resolution model, equally well-suited to home or office use. Its small footprint consumes significantly less space than many of other laser printers, making it admirably suited for use in places where space is at a premium.

Standard output resolution is 300 × 300 dots per inch. This can be boosted to 300 × 600 dots per inch, giving the printer a noticeable edge over the competition in clearly and sharpness of output.

The printing process used is that of laser beam scanning, described in the previous section.

The printer's engine is rated for five pages per minutes — more than adequate for home use, and fine for many commercial environments. Actual throughput, however, depends on several other factors as well, most importantly the complexity of documents that are transmitted to the printer for printing.

Paper feeding is from one of two sources, a slide-in cassette that fits compactly into the deck at the base of the printer chassis, and a front-loading tray. The cassette holds 250 sheets as standard and there is also an additional feeder unit and cassette available as an option that will increase cassette-feeding capacity to 500 sheets. The front paper tray can hold 50 sheets. A range of paper sizes (Letter, A4, Executive, B5, Legal), and envelope sizes — COM-10, Monarch, DL and C5 are available. Printing materials include plain paper, envelopes, labels and transparency films.

The printer is easily set up and controlled by means of the control panel and LCD display screen.

Connection to host computers is via any one of three ports — parallel, RS-232C serial or AppleTalk. Two computers connected to different ports may freely share the printer. The AppleTalk interface is only available for use with the LS-5TT or the LS-5EX with its optional TrueImage Board installed.

Internally the printer processes data using a fast, high-performance RISC chip — the 16 MHz INTEL 80960SA.

The LS-5EX comes with 1 MB of RAM as standard, and the LS-5TT comes with 2 MB of RAM as standard. This can be expanded to a maximum of 7 MB (LS-5EX) or 8 MB (LS-5TT), which is advisable if complex documents are to be processed, or if heavy use of fonts and macros is envisaged.

There are two emulations provided — Hewlett Packard's Printer Control Language (PCL), incorporating the GL/2 graphics language, and TrueImage, Microsoft's PostScript-compatible page description language. (The TrueImage emulation is only available for use with the LS-5TT or the LS-5EX with its optional TrueImage Board installed.)

In each emulation there are a selection of built-in fonts — 22 PCL fonts and 35 TrueType (the name for TrueImage's font format). This offers considerable typographic flexibility without the need to purchase additional fonts. Additional fonts may be installed on cartridge (HP emulation mode only) or downloaded from the host computer.

MEMO

Setting Up the Star LS-5 Series Printer

CHAPTER 2

The fact that you're now reading this manual shows that you've opened the carton containing your new Star LS-5 Series Printer. This chapter will help you to unpack the printer, set it up, and get it running.

First, you should make some preparations. You may already have decided on the printer's new location. Whether you have or have not, run through this checklist of requirements:

- **Environmental control**
  The printer and toner cartridge should never be exposed to strong sunshine or other direct heat sources. It should also be located away from air conditioning ducts, dust and fumes. Excessive moisture should be avoided, such as humidity in excess of 85% or less than 15%. If it is comfortable for you, then it will be comfortable for your printer.
- **A large, strong table or stand**
  The printer weights approx. 26.5 lbs (12kg) and must be firmly supported. Also, the printer will need more room than it takes up in the shipping carton, because the front paper tray will extend forward from the front; so plan for some additional space.
- **A three-pronged outlet**
  The outlet should be no more than 6.5 feet (2.0m) from the printer (the length of the power cord), preferably one shielded from power fluctuations. No motor-driven appliance should be connected to the same outlet. This will avoid interface with the printer's operations.
- **A fresh toner cartridge (product #EP-40XA)**
- **Paper**
  A package of 16 - 28 lb (60 - 105g/m^2) photocopier paper is best to start with; however, the printer can use thicker paper, as well as special media, such as envelopes and transparent sheets.

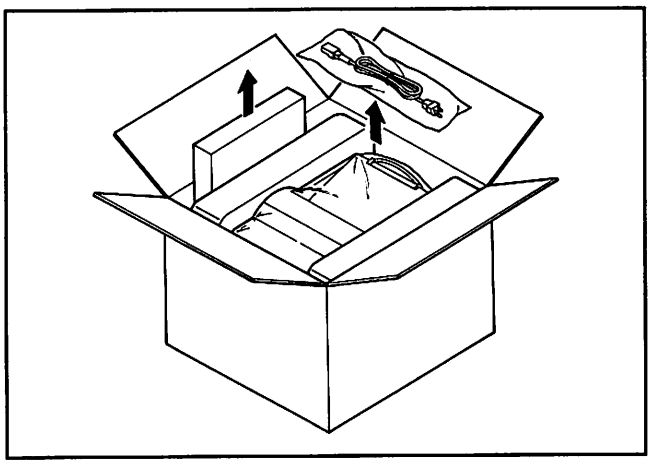
2.1 UNPACKING

The printer comes in two boxes. The large box contains the printer and its accessories, and the smaller one contains the toner cartridge. Follow these instructions when unpacking.

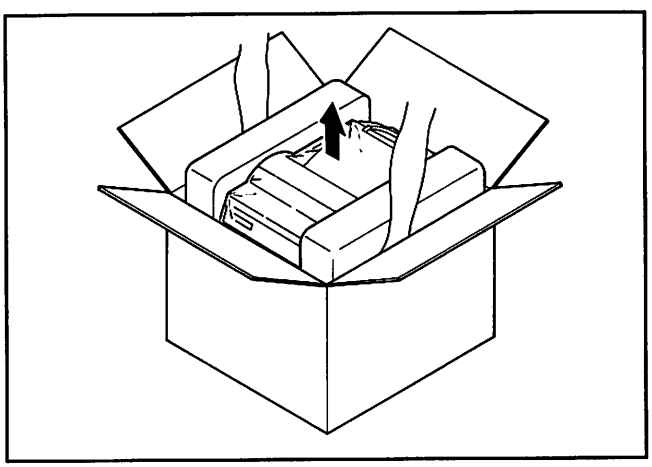
2.1.1 Unpacking the Printer

Follow the instructions below to unpack the printer.

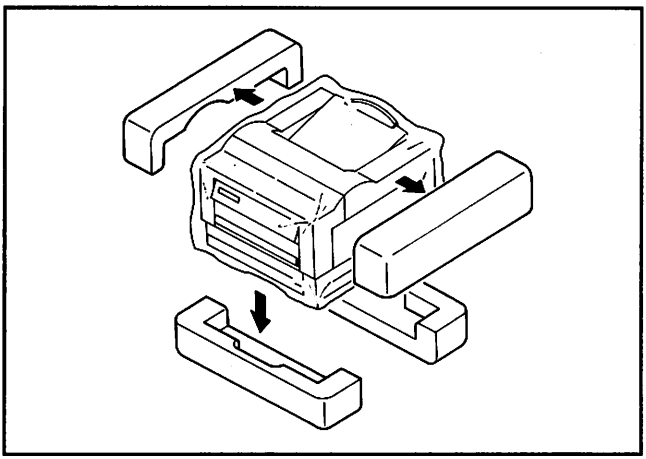
1. Open the large box, and remove the power cord and the accessories box.



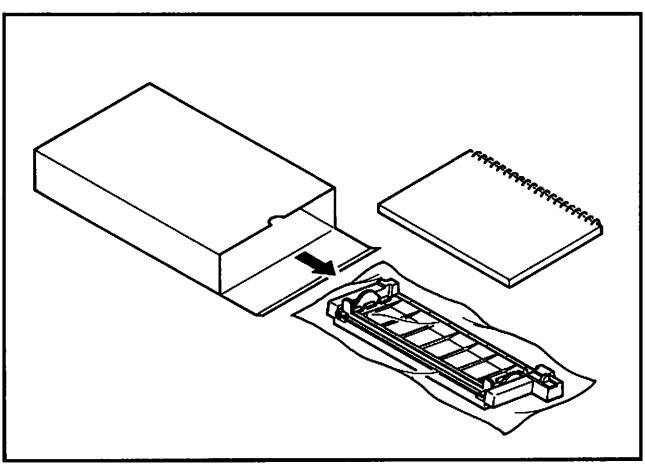
2. Carefully remove the printer from the box.



3. Remove the packing material from around the printer.

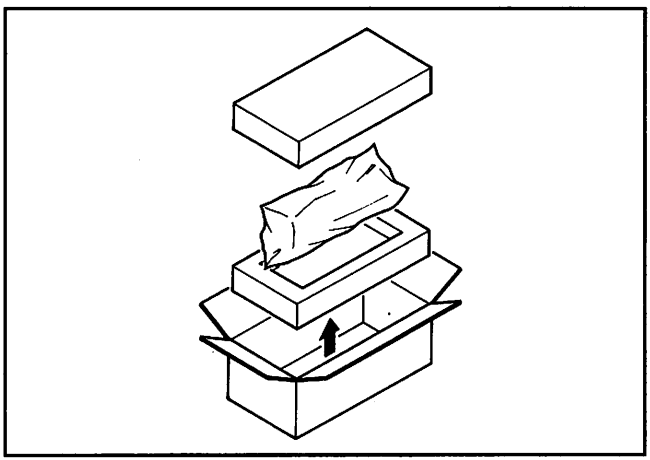


4. Open the accessories box. Remove the front paper tray and Operations Manual.



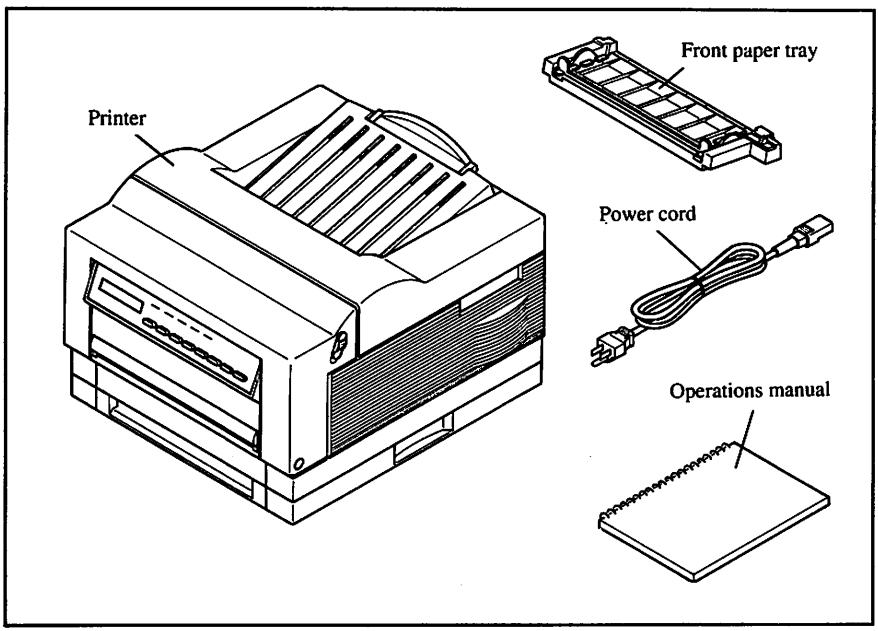
NOTE: Save the packing boxes and materials. If you need to move the printer (for relocating or service etc.), use these materials to protect the printer from damage.

5. Open the small box and remove the packing material from the toner cartridge.
   Do not open the aluminum bag containing the cartridge until you are ready to install it in the printer.



2.1.2 Checking the Parts

Before setting up the printer, make sure that all standard items shown below are provided and they are free from damage. If any of these items are missing or damaged, contact your supplier.



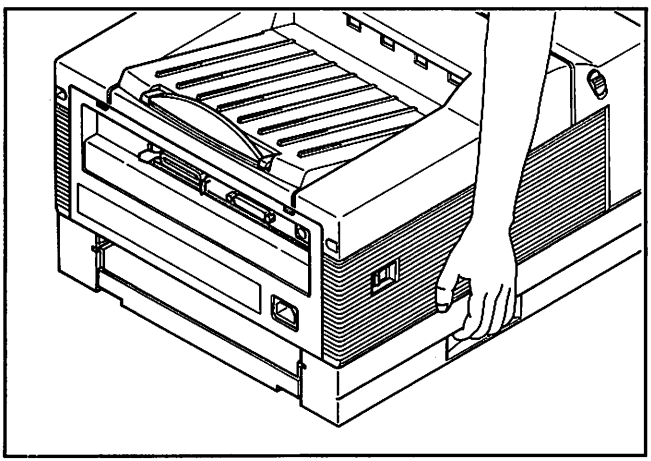
2.1.3 Optional Items

Some of the following items may have been ordered. Unpack them. For details, refer to "Chapter 8. Option".

- **Feeder Unit (250 Sheet Type, 500 Sheet Type)**
- **Paper Cassette (Universal, A4, Letter, Legal, B5, Envelope)**
- **Expansion RAM Board (1 MB, 2 MB)**
- **Expansion RAM Module (1 MB, 2MB)**
- **Font Cartridge**
- **TrueImage Board (For LS-5EX only)**

2.1.4 Carrying the Printer

Whenever moving the printer from one place to another, always make sure the front cover is closed, and carry the printer with two hands from handles provided on each side of the printer.



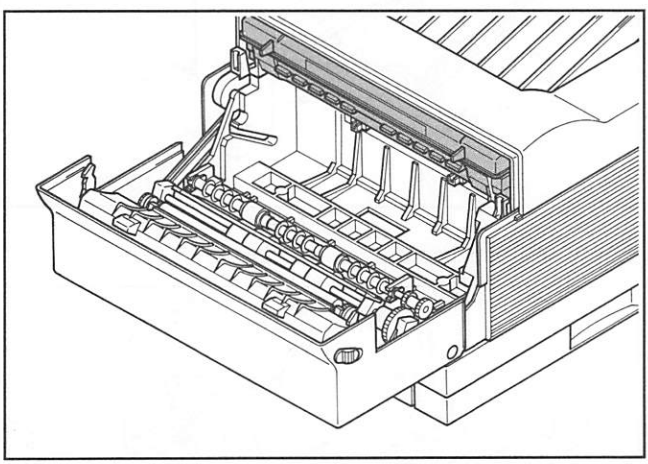
CAUTION: To avoid damage, always use the handles when attempting to move the printer.

NOTE: When moving the printer, remove the toner cartridge. After removing the cartridge from the printer, replace it in the original aluminum bag, or cover it with a thick cloth to protect it from direct light.

2.1.5 Opening and Closing the Printer

- When opening the printer's front cover, do not stop it in the half-way. This will open the protective shutter of the drum, and light may permanently damage the drum.
- Do not put anything in or on the front paper tray except paper, and do not press the tray downward.

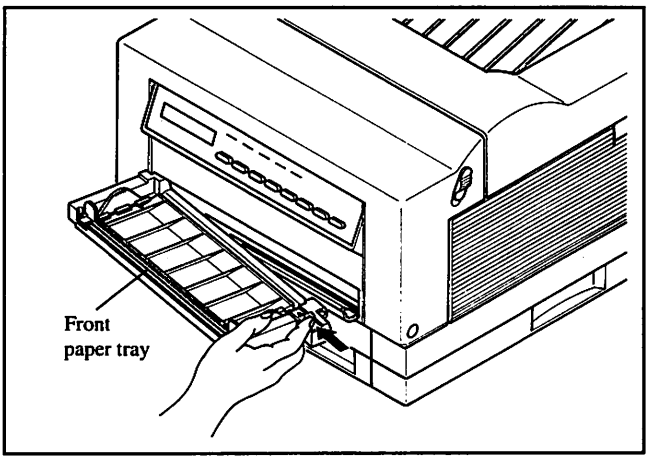
CAUTION: The shaded area in the illustration below become extremely hot when the printer is used. To avoid any personal injury, do not touch these parts when the printer is open.



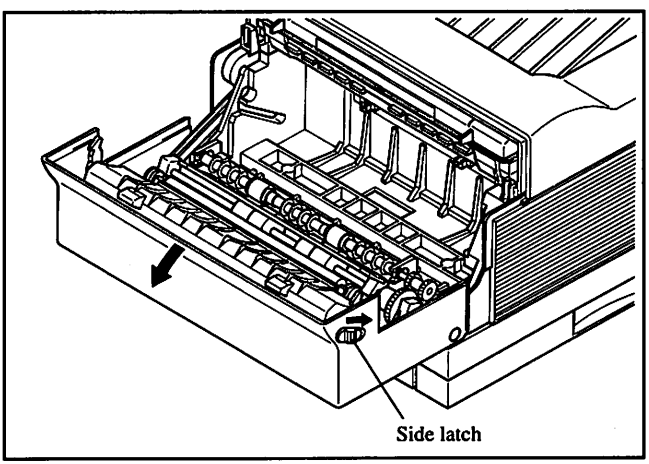
Although the printer's cover is closed while printing, it will need to be opened when replacing the toner cartridge or clearing paper jams. Open or close the cover in the following way:

Opening the Cover

1. Remove the front paper tray if it is installed. Failure to do so, may cause damage to the tray.



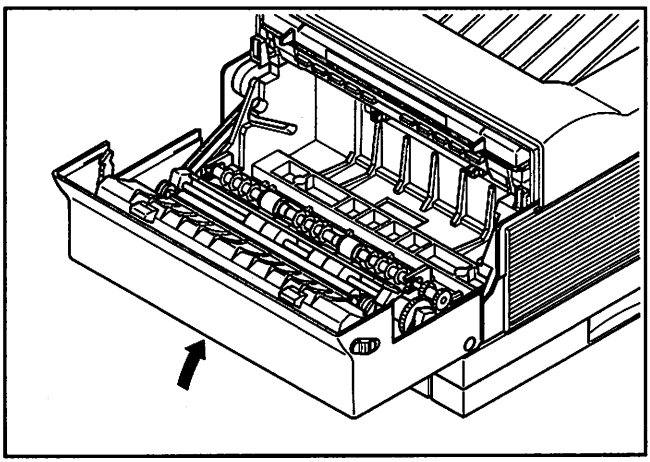
2. Release the side latches and open the cover.



The cover opens downward.
Do not stop the cover in the half-way. This will open the protective shutter of the drum, and light will permanently damage the drum.

Closing the Cover

Using both hands, lift the cover and close it gently until it latches.



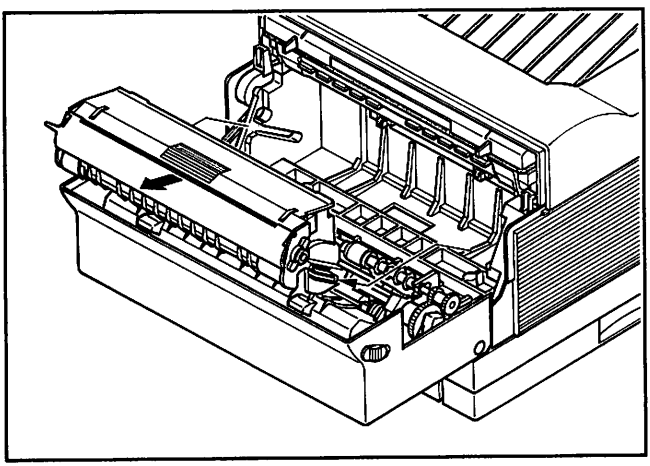
2.2 INSTALLING THE TONER CARTRIDGE

Important Notice

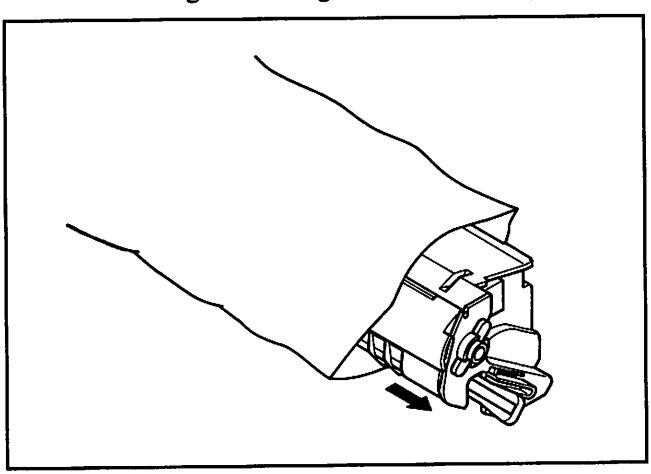
- Install the toner cartridge immediately after opening the aluminum bag. Permanent damage can be caused by exposing light to the photosensitive drum. NEVER expose the cartridge to the strong light (more than 15000 lux) or room lighting (1000 lux) for more than five minutes.
- Do not open the drum's protective shutter on the toner cartridge.
- Keep the cartridge away from CRTs, disk drives, diskettes, etc. Otherwise, CRTs and disk drives can be damaged, and data on diskettes can be destroyed by the magnetic force inside the cartridge.
- When handling the cartridge, do not touch the bottom of the toner cartridge. Print quality will be adversely affected if the protective shutter is open and the drum is damaged. The drum can also be damaged if it is exposed to light.
- Always keep the toner cartridge with the label facing up. Do not turn it upside down or stand it on end. The toner may become caked, and this causes print quality to deteriorate.
- Use the cartridge before the expiration date printed on the carton. Otherwise print quality may deteriorate.
- Use only genuine Star toner cartridge, EP-40XA.
- Dispose of your used toner cartridge as a noninflammable item.

Follow the instructions below to install the toner cartridge for the first time, or when replacing the used one.

1. Open the front cover as described in "2.1.5 Opening and Closing the Printer".
2. If you are installing the toner cartridge for the first time, skip to Step 3. If you are replacing the old toner cartridge, pull out the used toner cartridge and dispose it in the proper manner.
   NOTE: Keep the toner cartridge horizontally to avoid scattering leftover toner.

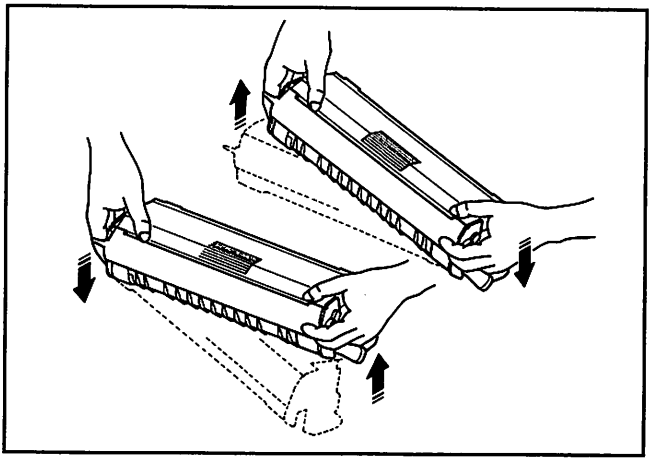


3. Open the aluminum bag containing the toner cartridge and remove it.

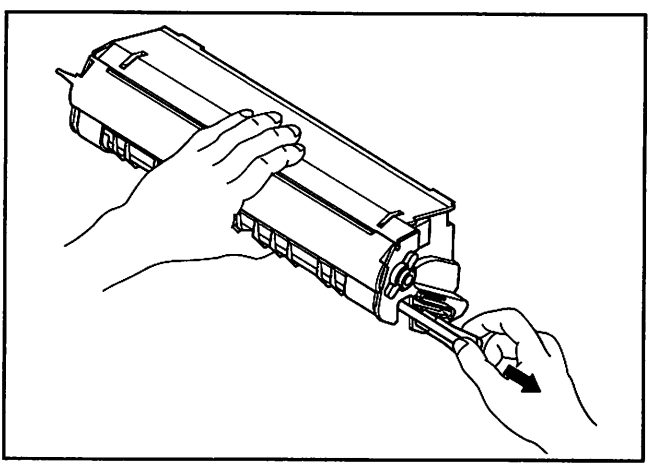


NOTE: Save the aluminum bag, as you may need it for storing the cartridge when you move the printer to another place in the future.

4. Holding the cartridge with both hands, rock it gently from end to end, 7 or 8 times, to distribute the toner evenly. If the toner is not distributed evenly in the cartridge, it may adversely affect print quality.

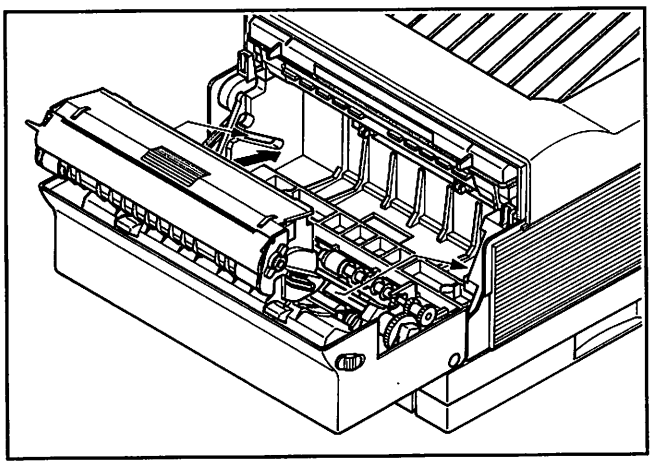


5. Place the cartridge on a flat surface. While holding down the cartridge with one hand, use the other hand to pull the tab to remove the seal.

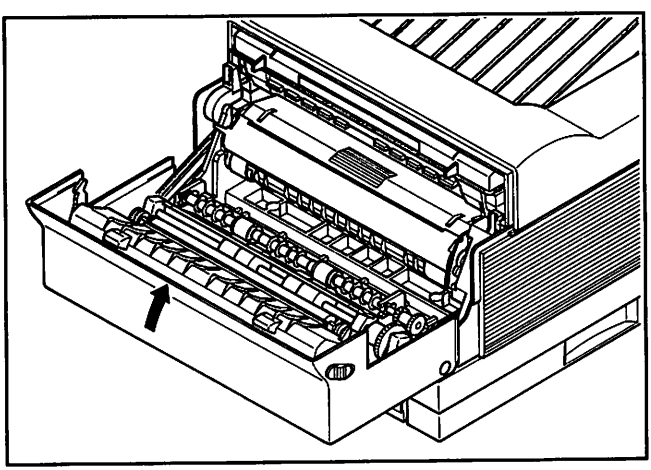


Make sure that the tab is pulled smoothly in a direction parallel to the flat surface. Otherwise, the tape may break or snap, making the cartridge unusable.

6. Align the guides on the toner cartridge (marked by an orange line) with the guides inside the printer (marked by an orange arrow) and gently slide the cartridge into position.
   NOTE: Do not touch the rollers and the gears inside the printer.



7. Make sure that the cartridge is securely seated, then close the cover gently.



2.3 LOADING PAPER

2.3.1 Selection of Paper

Print quality and printer life are greatly affected by the paper used. To optimize print quality, we recommend that you use paper; as well as envelopes, labels and transparencies, that are designed for use in laser printers or copiers. Paper can be fed into the printer either from the front paper tray or paper cassette. Types and sizes of paper can be used are listed below.

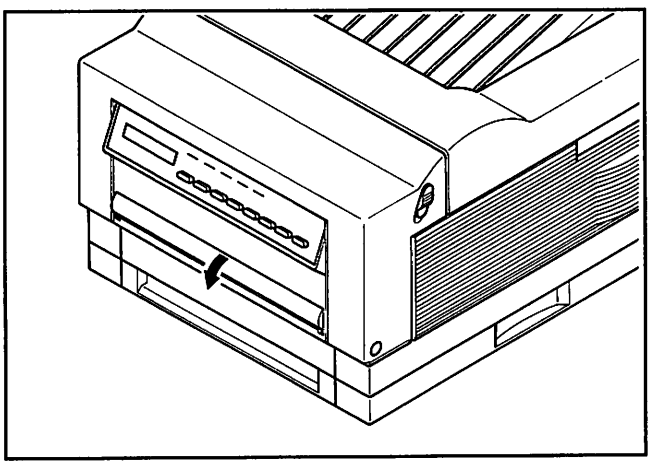
Type	Size	Weight
Plain paper	A4 (210 mm × 297 mm) Letter (8.5" × 11") B5 (182 mm × 257 mm) Executive (184 mm × 267 mm) Legal (8.5" × 13")	60 g/m² to 105 g/m² (For paper cassette) 60 g/m² to 135 g/m² (For the front paper tray)
Envelope	COM-10 (105 mm × 241 mm) MONARCH (98.5 mm × 199 mm) DL (110 mm × 220 mm) C5 (162 mm × 229 mm)	60 g/m² to 105 g/m² (For paper cassette) 60 g/m² to 135 g/m² (For the front paper tray)
Labels	A4 (210 mm × 297 mm) Letter (8.5" × 11")	
Transparency films	A4 (210 mm × 297 mm) Letter (8.5" × 11")	

2.3.2 Loading Paper Into the Front Paper Tray

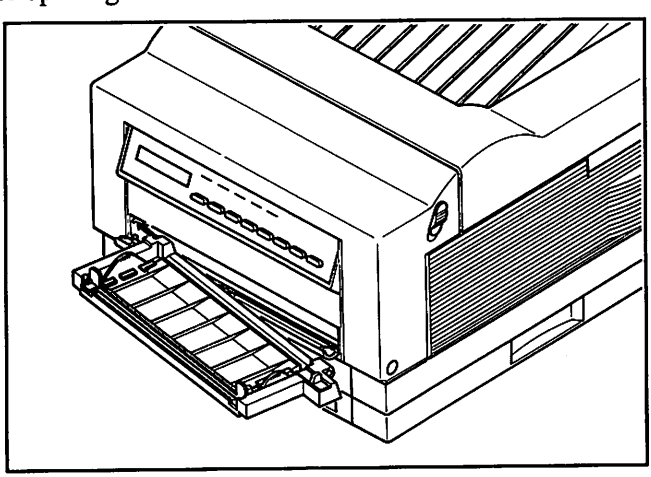
Installing the Front Paper Tray

Before loading the paper, install the front paper tray with the following procedure.

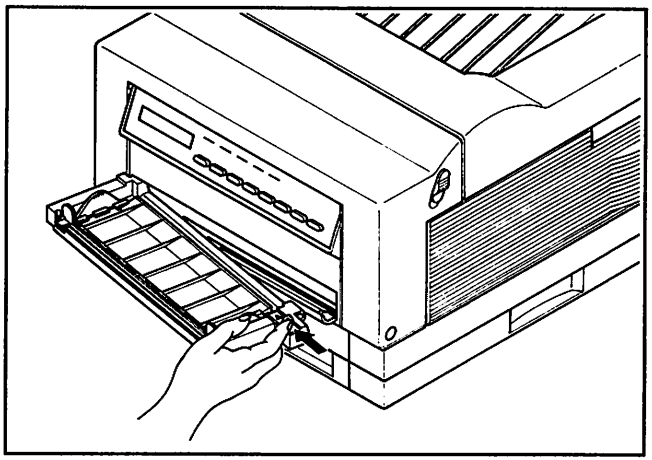
1. Open the front paper tray cover.



2. Insert the metal knob on the left side of the front paper tray into the left hole of paper opening.

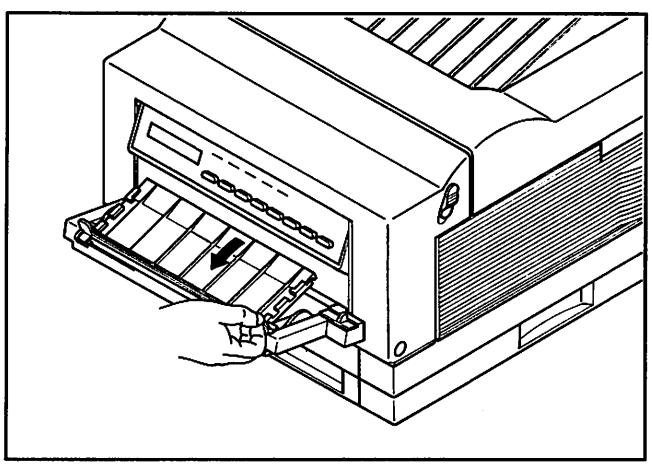


3. Insert the right side of the tray while sliding the black lever of the tray to the left. Then, release the lever.



4. Flip open the folded tray by pressing down on the tab located on the right side of the tray.

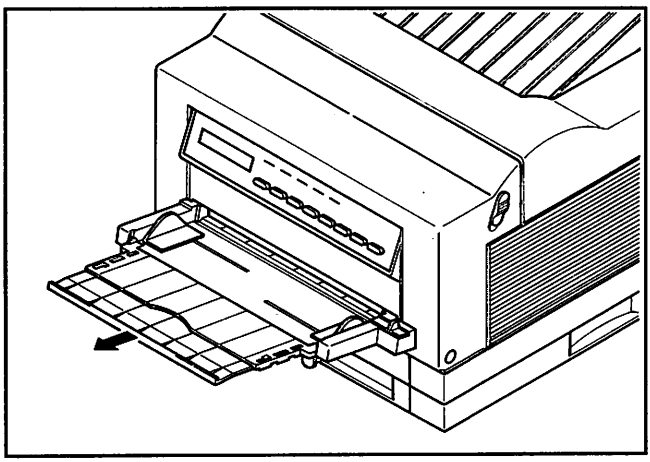
   CAUTION: Do not push down on the tray or load heavy things to avoid damaging the tray.



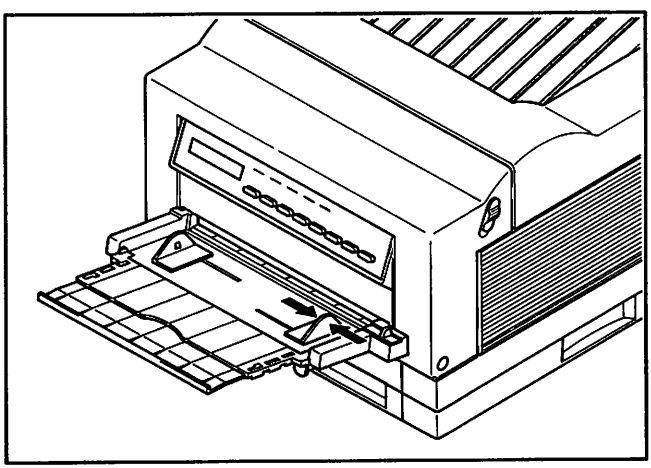
Loading Paper

Now, you are ready to load paper into the front paper tray.

1. Pull out the extension tray for standard length paper.

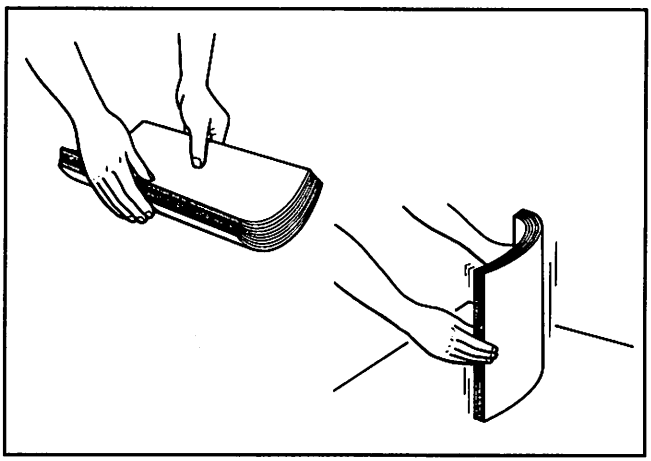


2. Adjust the side guide to the desired paper size.



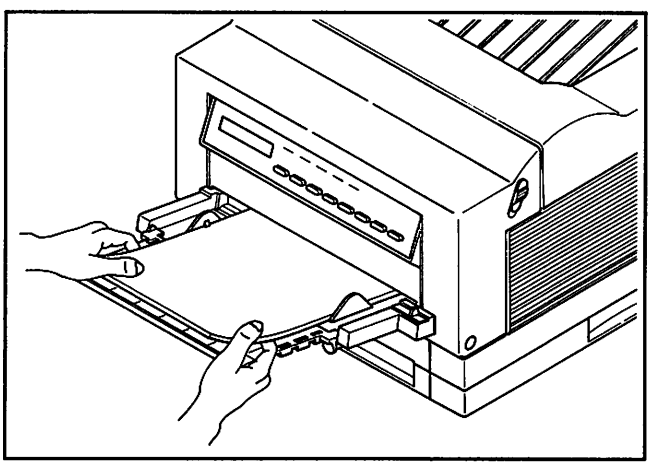
3. Take a small stack of paper and align the edges by tapping it on a flat surface.

   NOTE: Fan the transparencies or labels before loading them into the paper tray.



4. Insert paper, with the print surface face-down, as far as it will go.

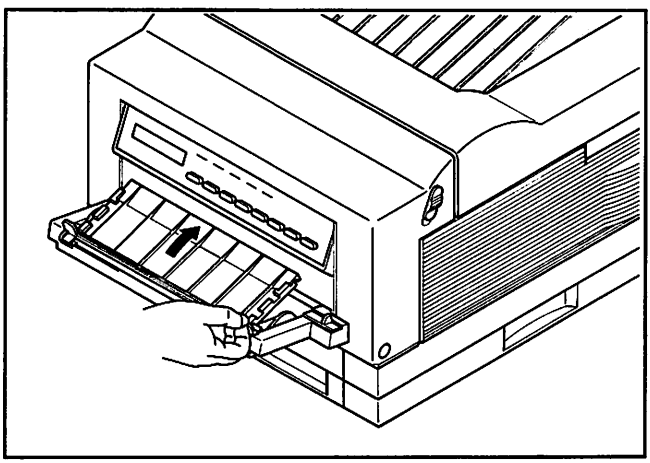
   CAUTION: Do not stack paper higher than the limit mark.



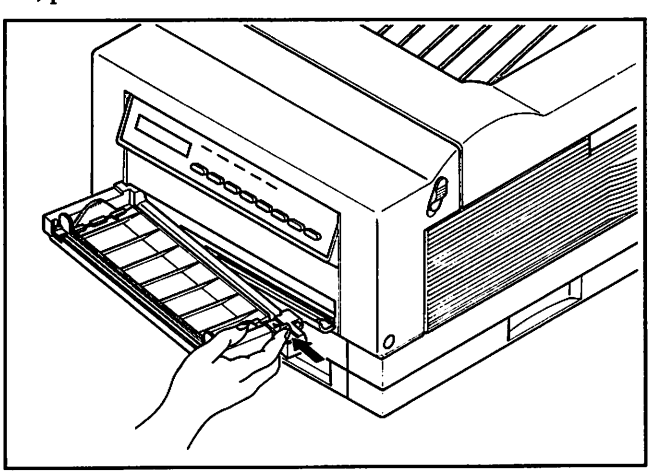
Removing the Front Paper Tray

Remove the front paper tray when you replace the toner cartridge, clear a paper jam, open the front cover, or move the printer.

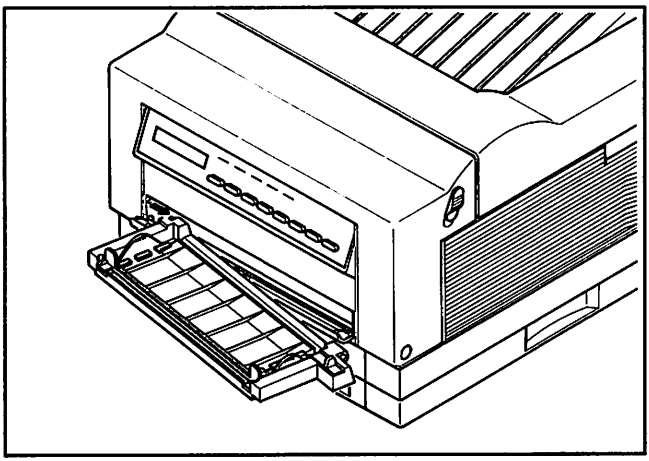
1. Remove the paper from the front paper tray.
2. Slide the side guide to its widest position.
3. Fold back the extension tray.



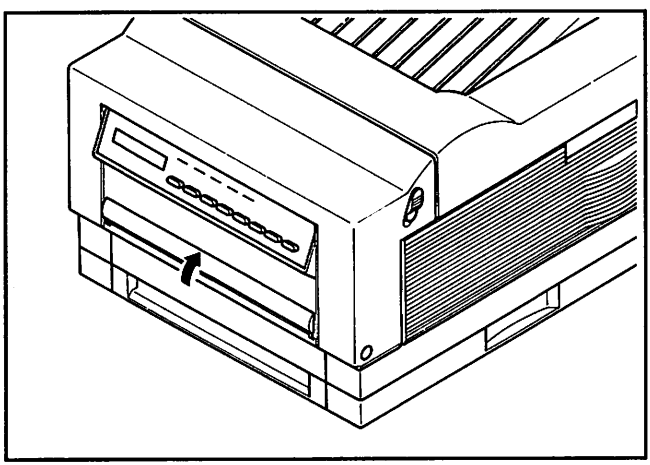
4. Detach the right side of the tray by sliding the black lever of the tray to the left. Then, pull forward and release the lever.



5. Detach the left side of the tray.

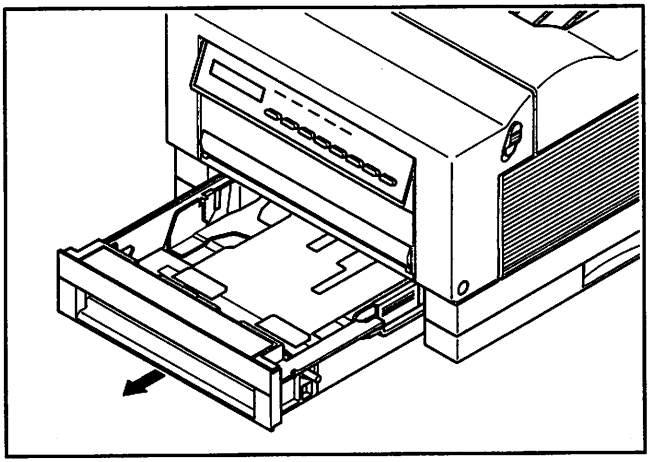


6. Close the front tray cover.

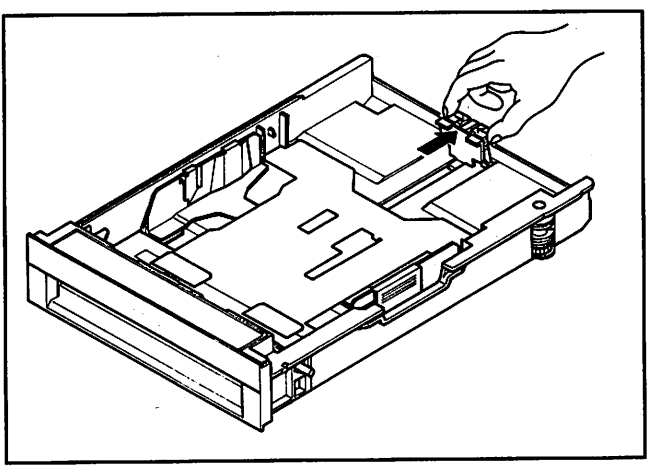


2.3.3 Loading Paper Into the Paper Cassette

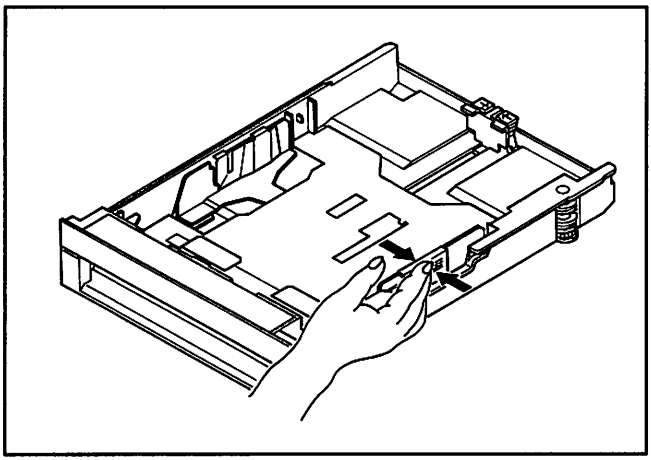
1. Remove the paper cassette from the printer.



2. Pinch the end guide and slide it back as far as it will go.

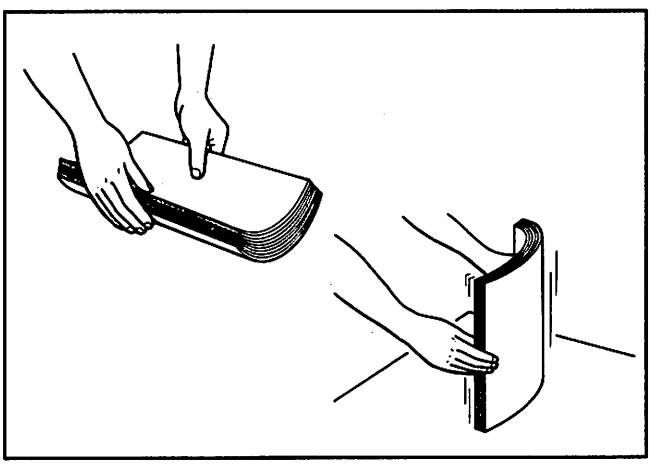


3. Adjust the side guide to the desired paper size.

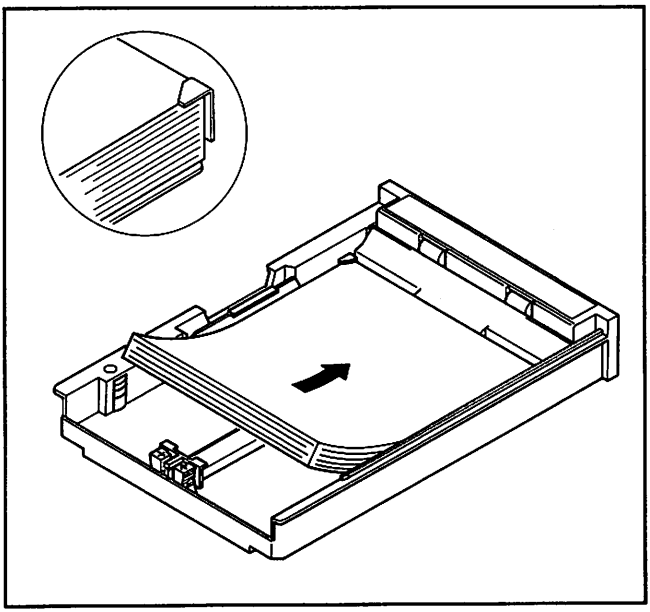


4. Take a small stack of paper and align the edges by tapping it on a flat surface.

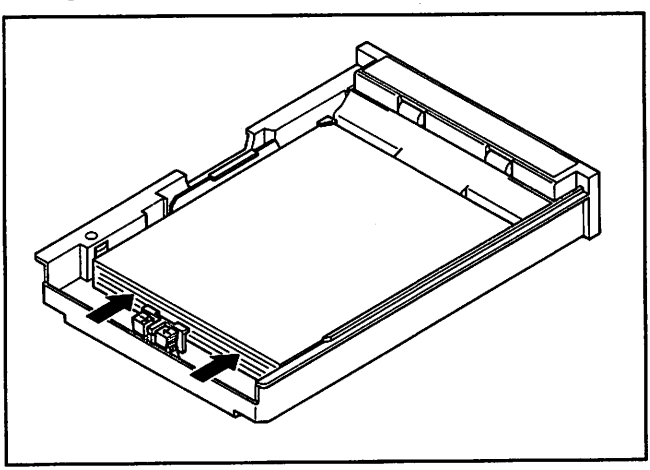
   NOTE: Fan the transparencies or labels before loading them into the paper cassette.



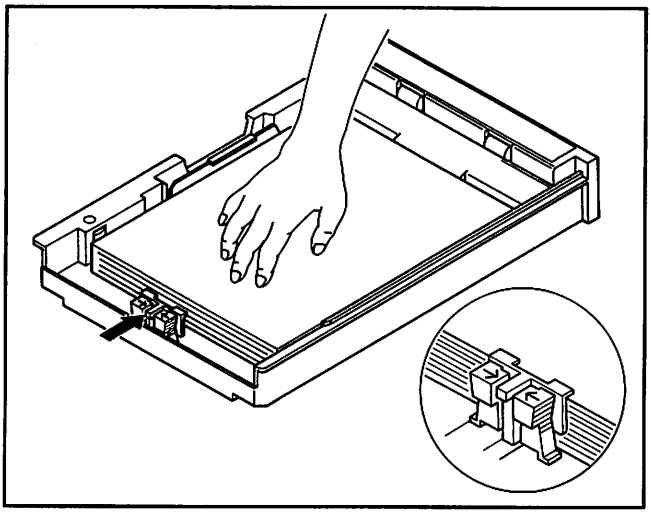
5. Slide the paper edges under the metal retaining clips with the print surface face-down.
   CAUTION: Do not stack the paper higher than the limit mark.



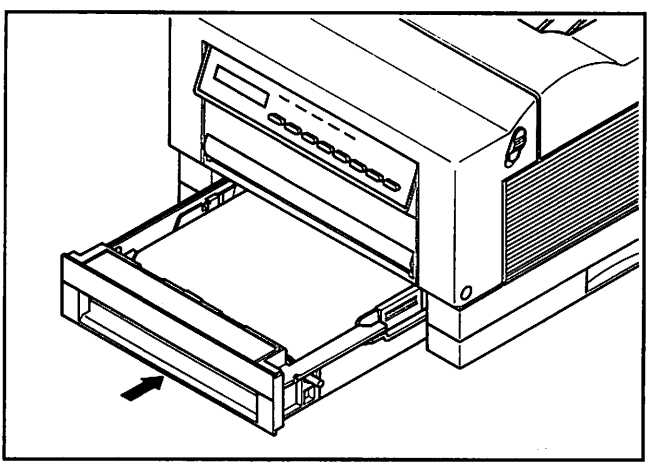
6. Align the edges of the paper.



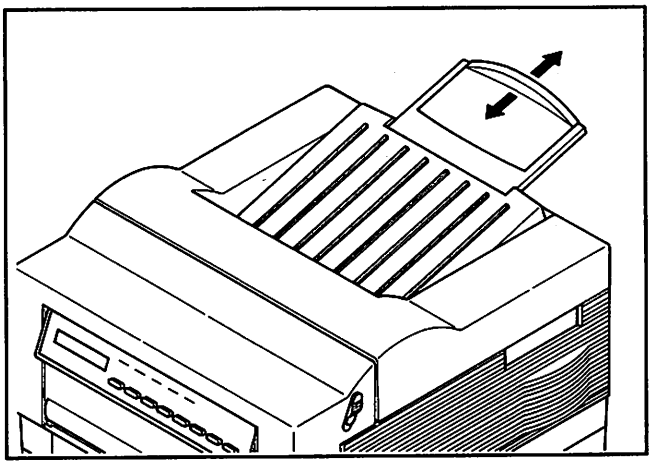
7. Slide the end guide to touch the paper edge.
   Make sure the paper edge is under the plastic tab of the end guide.



8. Insert the paper cassette into the printer.



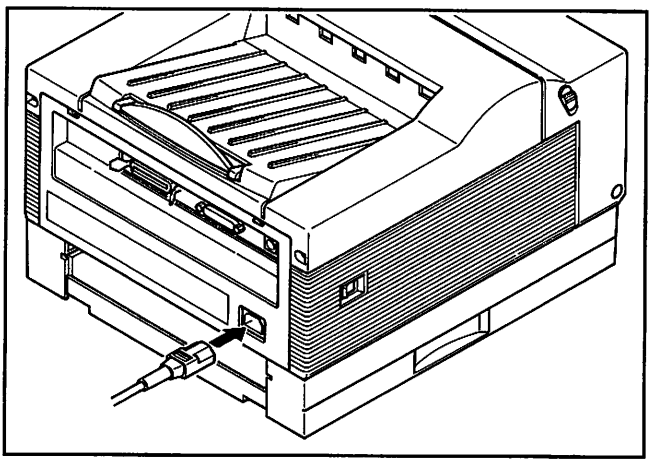
9. Adjust the output tray to the desired paper size.



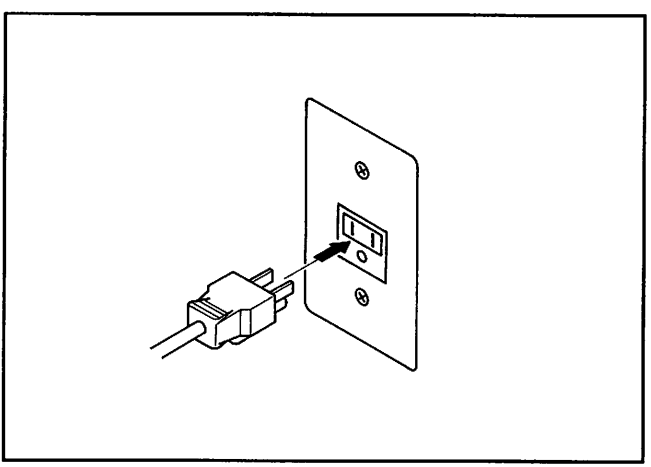
2.4 CONNECTING THE POWER CORD

Make sure that the power switch on the printer is set to OFF, then connect the power cord to the printer and an AC power outlet as shown below:

1. Insert the power cord into the receptacle on the back of the printer.



2. Insert the power cord into a grounded outlet.



Only use the power cord supplied with the printer. Note that this power cord is fitted with a ground pin. This grounding is an important safety feature and should not be ignored. If a suitable grounded socket is not available, contact a qualified electrician to rectify the situation.

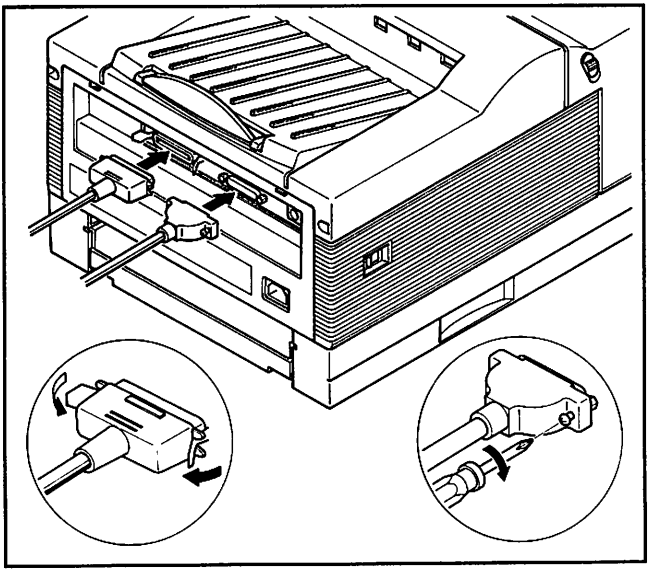
2.5 CONNECTING THE INTERFACE CABLE

The host computer transmits information to the printer through an interface cable. The printer is provided up to three types of interface (serial, parallel and AppleTalk).

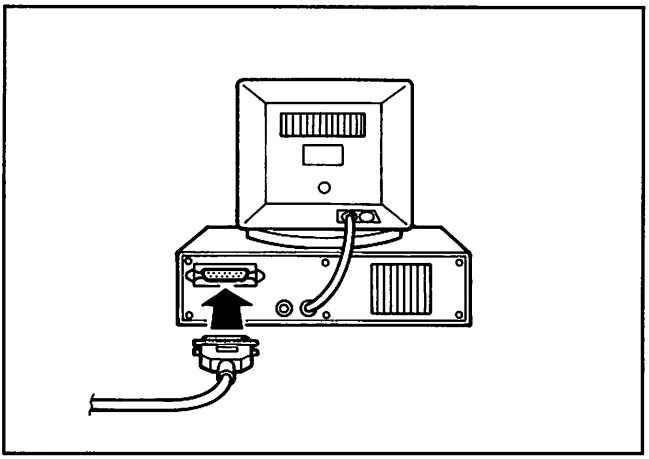
The AppleTalk interface is only available for use with the LS-5TT or the LS-5EX with its optional TrueImage Board installed.

An interface cable is not supplied with the printer. Determine the kind of interface cable you want to use, and purchase the appropriate cable from your supplier.

1. Before connecting the interface cable, make sure that the power to the printer and the computer is turned off.
2. Plug one end of the interface cable into the appropriate connector on the rear side of the printer.
3. For parallel (Centronics) interface, secure the cable connector using connector clips. For serial interface, fasten the cable connector using screws.



4. Connect the other end of the cable to the appropriate interface on the host computer.



NOTE: The printer's factory setting is for a parallel interface. If the serial interface is to be used, you need to select the interface on the control panel. See "4.3.1 Selecting the Serial Interface" for selecting type of interface.

Initial Operation

CHAPTER 3

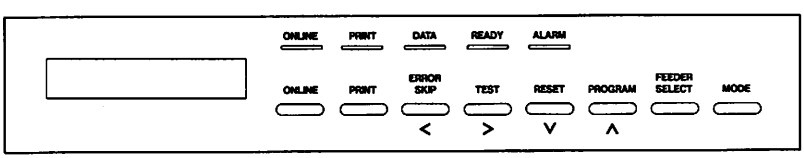
3.1 FRONT PANEL

The front panel of Star LS-5 Series is a combination control board and interactive message center. The panel consists of:

- **a 2-line, 32 character LCD display screen**
- **5 LED lights**
- **8 momentary contact buttons**

The momentary contact buttons permit you to perfrom various printer functions. In turn, the printer uses the display screen and the light indicators to convey information to you.

The screen display is the primary way the printer communicates with the operator. It informs the operator about the machine's overall state including: the printer's status, alarm conditions that require some action by the operator, "soft" errors, and messages when selecting current, initial and default printer parameters. The LEDs provide an "at a glance" summary of the printer's status.



The printer operates in two main modes when the printer is off-line:

- Normal Mode — performs the function labeled above the button.
- Program Mode — press the (PROGRAM) button to enter menu selections.

The meaning and use of the panel buttons depends on the mode in which the printer is operating.

3.1.1 Powering Up

Please note the following points when turning the printer on or off.

Power on: First turn on the computer, then all other devices, and finally turn on the printer.

Power off: First turn off the printer, then all other devices, and finally turn off the computer.

CAUTION: Always wait at least three seconds between turning off and turning on again.

Turn on the printer by pressing the "I" side of the power switch. The printer will begin its internal diagnostics and warming up, displaying a series of messages on the screen as follows.

1. All LEDs are lit and the LCD display turns black.
2. The screen displays "`Star LS-5EX`" (or "`Star LS-5TT`") on the first line.
3. Then the screen displays "`Memory Test 1MB`" ("`Memory Test 2MB`" for the LS-5TT) on the second line.
   If an optional 1MB RAM board has been installed, the message will display "`Memory Test 2 MB`" with the LS-5EX. The actual value depend on the size of the RAM board installed.
4. After a short while, the screen will momentarily display "`EEPROM LOAD DONE`". This means that default parameters have been read from the EEPROM and the EEPROM CRC has been checked.
5. "`PRINTER WARMUP`" is displayed, the READY indicator starts blinking and the ON LINE lights up.
6. When the printer is ready, the screen displays "`PRINTER READY`" and the READY indicator is now continuously lit.

3.1.2 The Buttons

This section explains the various meaning and uses of the buttons, including their light indicators, when applicable. Keep in mind that the buttons' functions depend on the mode the printer is in: the Normal Mode and Program Mode.

ON LINE

Pressing this button switches the printer from off-line to on-line or vice versa. When the printer is on-line (ON LINE LED is lit), the printer is able to receive information from the computer and print it. All other buttons (except (ERROR SKIP) button under certain conditions) are inactive when the printer is on-line.

When the printer is off-line, the printer is unable to receive information and print, but the other buttons can be used. If the printer is in the Program Mode, pressing this button will exit the printer from the Program Mode, and enter it into the Normal Mode.

PRINT

This button is active only when the printer is off-line. Pressing the button will print and eject any page of data. If there is no data in the printer, the depression of the button will be ignored. When printing is in operation, the LED is lit.

ERROR SKIP/<

This button is active only when the printer is off-line. In the Normal Mode, pressing this button has no effect if no alarm condition exists. However, if an alarm or warning condition exists, pressing this button causes the printer to return to the previous state after corrective action has been taken.

When the printer is off-line and in the Program Mode, this button is called NEXT(<). During programming, pressing this button displays the various items under a category for the operator to select next in the sequence.

TEST/>

Pressing this button when the printer is in Normal Mode will operate in the following sequence:

1. Pressing this button displays "HOLD FOR TEST" on the bottom line of the LCD display screen. If the button is released while this message is displayed, the printer returns to the previous state.
2. If the button is held down for two seconds, the screen will display "STATUS SHEET" on the top line. If the button is released, the printer will print a status sheet (see "3.2.1 Printing Test Sheets").
3. If the button is pressed for two more seconds (except in Hex Dump mode), the screen will display "FONT LIST" on the top line. If the button is released, the printer will print a font list.
4. If the button is pressed for two more seconds (in the TrueImage Emulation mode), the screen will display "TEST PAGE" on the top line, and the printer will print a test page.

When the printer is off-line and in the Program Mode, this button is called PREVIOUS(>). During programming, pressing this button displays the "previous" items under a category for the operator to select in the sequence.

RESET/∨

This button has three functions when the printer is off-line.

- Pressing and holding this button when the printer is in the Normal Mode the screen will display "HOLD FOR RESET". If this button is held for more than two seconds, "REINITIALZED" message is displayed on the screen and the printer is reinitialized to the initial settings of the emulation currently selected. This will also clear the input buffer, any page in composition, and all composed pages queued up.
- When the printer is in the Program Mode, this button is called ENTER(∨). Pressing this button "enters" the current category and selects it. This is indicated by a "@" symbol.
- Turning the power on while holding down this button causes the printer to enter the display language selection mode. (See "4.9 Selecting Display Language".)

PROGRAM/∧

To start using the Program Mode, you must first set the printer off-line, then press this button. Within a programming sequence, pressing this button takes the programming menu to the next higher level, or exits from the Program Mode and displays "PRINTER READY". For details, refer to "3.3 Programming from the Control Panel".

FEEDER SELECT

This button temporarily selects the paper feed location and paper size that the printer expects during printing. To change from one source to another, the printer must be off-line. Press the (ONLINE) button if the ON LINE LED is lit, then press the (FEEDER SELECT) button. The screen will display "FEEDER SELECT" on the top line.

- If the button is released while this message is displayed, the screen displays the current feeder selection on the bottom line. Further presses of the button will cycle through the options below:

```
Cassette Only (Factory setting)
Auto Selection
Cassette
Lower Cassette
Front tray
Manual
```

NOTE: The display screen will indicate the only available options.

- Holding down this button for more than two seconds causes the screen to display "FRONT TRAY SIZE" except when "Cassette Only" is the current feeder selection. If the button is released while this message is displayed, the screen will display the current front tray size on the bottom line. Further presses of the button will cycle through the options below:

```
Paper: Letter
Paper: Legal
Paper: A4 (Factory setting)
Paper: Executive
Paper: B5
ENV: Monarch
ENV: COM-10
ENV: Intntnl DL
ENV: Intntnl C5
```

To exit from these modes, press the (ONLINE), (TEST), (RESET), or (PROGRAM) button.

MODE

With this button, you can recall up to two previously stored printer configurations. The configuration selected by this control will be recalled and stored as the Current and Initial Setting.

To change from one configuration to another, the printer must be off-line, press the (ONLINE) button if the ON LINE LED is lit, then press the (MODE) button. The screen will display "`MODE SELECT`" on the top line and the current selection on the bottom line.

Further presses will cycle through the options below:

```
No Change
Mode 1
Mode 2
```

To exit from this mode, press the (ONLINE), (TEST), or (RESET) button.

3.1.3 Light Indicators

ON LINE

The ON LINE LED shows that the printer is ready to receive data (the printer is set on-line) when this LED is lit. This LED is off when the printer is not ready for receiving data (the printer is set off-line). The LED flashes when the printer is printing a page or when the printer is switching from on-line to off-line.

PRINT

This LED is continuously lit while a page is being transferred through the printer. Otherwise, the LED is always off.

DATA

The DATA LED is continuously lit when data has been received and not printed yet, and flashes when the printer is waiting for more data. The DATA LED will go out when all received data has been processed. Do not turn the printer off while the DATA LED is lit, otherwise data will be lost.

READY

The READY LED is lit when the printer is ready for use. This LED flashes when the printer is warming up.

ALARM

This LED will light up in the event of an error which requires the operator to take action (e.g. paper out). The bell will sound for 2 seconds whenever this LED lights up.

3.2 SELF TEST

The Star LS-5 Series test print provides a summary of the printer's capabilities. It shows the quality of text printing. It summarizes the printer's configuration, including the amount of memory and which fonts are installed or available. It explains how the printed page will look with the current settings. This includes paper size and page layout. It tells whether the parallel or serial interface is active.

3.2.1 Printing Test Sheets

There are three tests available. Also refer to "TEST/>" of "3.1.2 The Buttons".

- **Printing a status sheet**

Hold the (TEST) button until the screen displays "STATUS SHEET". Releasing this button will print the status sheet.

- **Printing a font list**

Hold the (TEST) button for four seconds, until the screen displays "FONT LIST".
When you release the button, the printer will produce a font list.
For details, refer to "Chapter 5. Font Selection".

- **Printing a test page**

This function is valid only in the TrueImage emulation mode.
Hold the (TEST) button for six seconds, until the screen displays "TEST PAGE".
The printer will print a test page sample.

3.2.2 Status Sheet Description

You can know several things about the printer's operation by just looking at the printed page. First (and obviously) the printer is operating. Second, the page is printed in the portrait orientation. That is, the text appears on the page the way portraits are usually painted, higher than they are wide. When the printed area is wider than it is high, the orientation is referred to as landscape. If the printer is set for landscape orientation, your print job is printed that way.

The status sheet is divided into two sections. The first section summarizes your printer's basic configuration, identifying the version of its operating system (Firmware rev.) and specifying the amount of total RAM (memory) and the amount of RAM available for your use. If your printer has an optional RAM expansion board, its memory size is also listed here.

The latter portion of the status sheet provides information on the various set-up parameters for the printer. You can change any of these parameters by programming them from the front panel.

The printer is capable of displaying three sets of parameters:

- Initial — the settings that will be recalled when the printer is first turned on, unless they were manually changed from the control panel.
- Mode 1 (Power-up) — the settings that are stored in the printer's memory. It is also the settings that will be recalled when the printer is first turned on.
- Mode 2 — an alternative set of parameters which can be easily recalled.

The function of the EMULATION GROUP is:

- Emulation — the printer whose functions the Star LS-5 is set to act like.

The function of the NUMBER OF COPIES GROUP is:

- Number of copies — the number of copies of each page to be printed.

The function of CHARACTER GROUP is:

- Character — character source, number, point, pitch, symbol set.

The function of PAGE SIZE GROUP is:

- Page Size — the size of the paper.
- Right End — the width of printable area for A4 sized paper.

The function of the LAYOUT GROUP is:

- Orientation — portrait or landscape.
- Margin settings — left, right and top in relation to the available page area, and page (text) length in number of lines.
- VMI — Vertical Motion Index. VMI refers to the smallest increment that can be made in the vertical or y axis. Line spacing is a multiple of VMI.
- End of line — whether auto wrap function is on or off.
- Auto line feed — whether there is an automatic carriage return (CR) at a paragraph break, an automatic line feed (LF) at the end of each line, and a form feed (FF) after each page.

The PAPER FEED GROUP includes:

- Feeder — where the paper will be fed from.
- Front Tray Size — the size of paper to be used by the front paper tray.

The function of PRINTER COMMANDS GROUP is:

- Printer Commands — whether the printer recognizes both PCL and GL/2, or GL/2 only.

The REP is an acronym for Resolution Enhancement Procedure. This function is:

- REP — whether the resolution enhancement is active or not.

The INPUT BUFFER GROUP function includes:

- Input Buffer — memory capacity of the input buffer.

The function of the INTERFACE GROUP is:

- Interface — parallel, serial, or AppleTalk (LS-5TT).

The function of the PRINT DENSITY is:

- Print density — select the print density to be printed: dark, semi-dark, medium, semi-light, or light.

The function of the AUTO PAPER FEED is:

- Auto paper feed — how long the printer waits for data before ejecting the page.

3.3 PROGRAMMING FROM THE CONTROL PANEL

The various parameters selectable from the control panel are arranged in an outline form, or a hierarchy. This means there are main groups and several levels within each one.

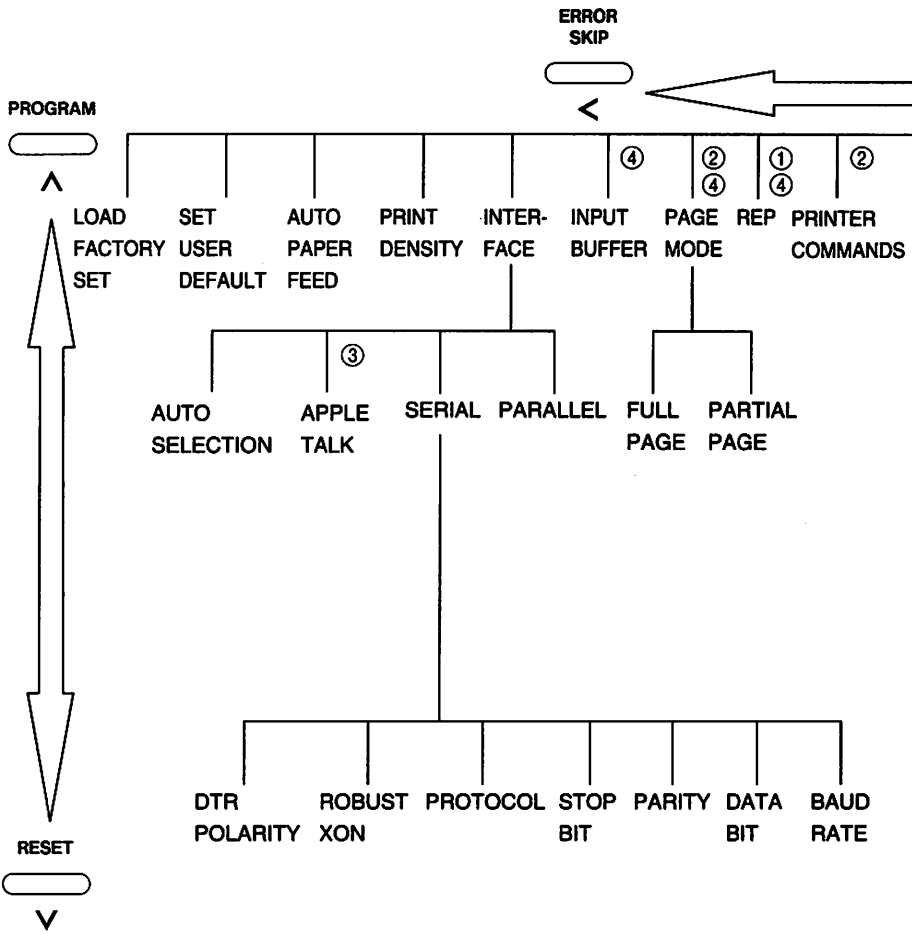
Remember: you enter (by pressing (V)) or exit (by pressing (^)) a level to select the previous (by pressing (>)) or next (by pressing (<)) item within a group.

To get into the Program Mode, you must perform two actions:

- Press (ONLINE) to go off the ON LINE indicator, then
- Press (PROGRAM). This will cause the screen to display "PROGRAM MODE" on the first line, and the "NUMBER OF COPIES" on the bottom line.

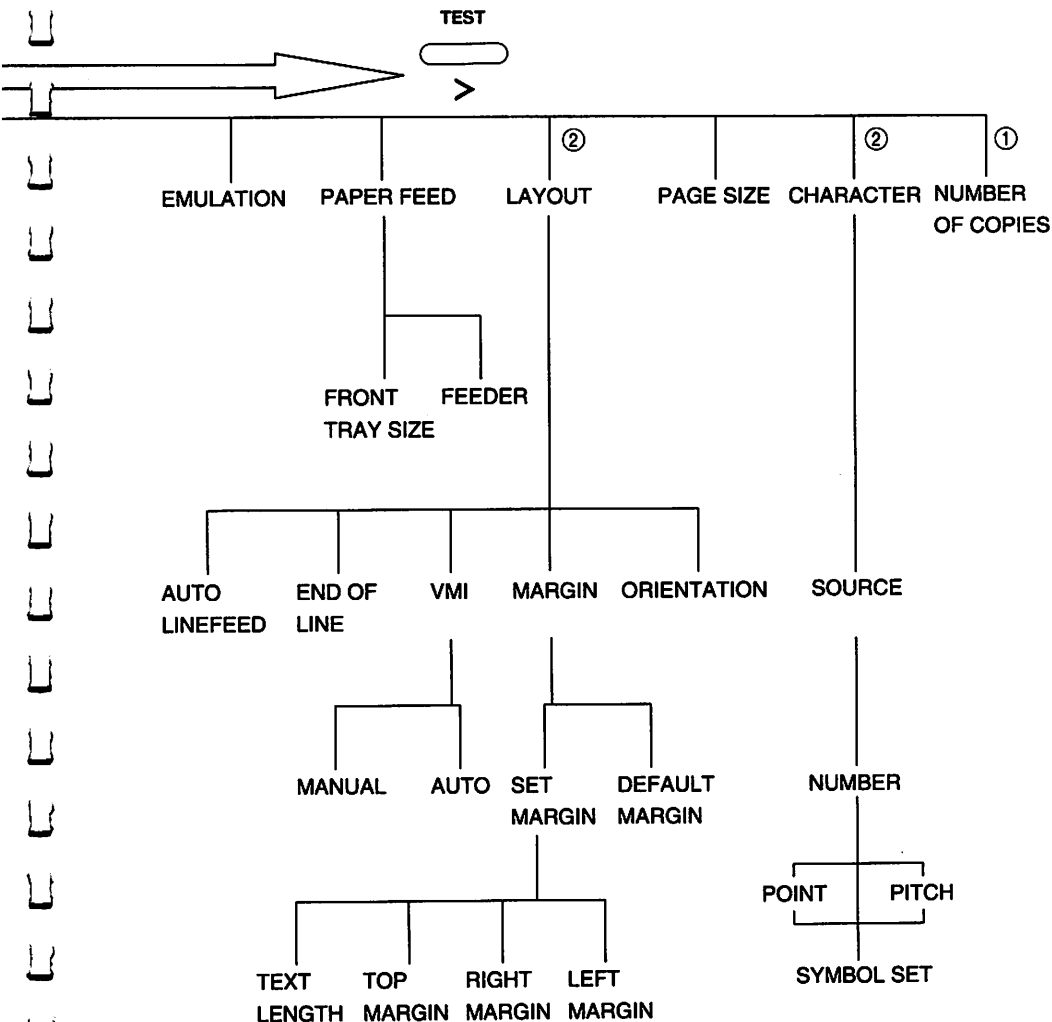
The order of the main categories within Program Mode is:

```
NUMBER OF COPIES
CHARACTER
PAGE SIZE
LAYOUT
PAPER FEED
EMULATION
PRINTER COMMANDS
REP
PAGE MODE
INPUT BUFFER
INTERFACE
PRINT DENSITY
AUTO PAPER FEED
SET USER DEFAULT
LOAD FACTORY SET
```


ERROR
SKIP
PROGRAM
④
②
④
①
④
②
LOAD
FACTORY
SET
SET
USER
DEFAULT
AUTO
PAPER
FEED
PRINT
DENSITY
INTER-
FACE
INPUT
BUFFER
PAGE
MODE
REP
PRINTER
COMMANDS
③
AUTO
SELECTION
APPLE
TALK
SERIAL
PARALLEL
FULL
PAGE
PARTIAL
PAGE
DTR
POLARITY
ROBUST
XON
PROTOCOL
STOP
BIT
PARITY
DATA
BIT
BAUD
RATE
RESET

NOTE:

① Skip in Hex Dump mode
② HP emulation mode only
③ TrueImage mode only
④ Skip without Expansion RAM Board



MEMO

Quick Start with the Star LS-5 Series: A Tutorial

CHAPTER 4

Some people like to read the documentation through from beginning to end. Others like to plunge right into the hands-on mode, using documentation as a quick reference guide.

This chapter is for both groups. It can be read in sequence with the rest of the book, or it can be used as a stand-alone aid.

4.1 PRELIMINARIES

Your Star LS-5 Series Laser Printer comes in two basic parts:

- **the printer body**
- **the toner cartridge**

When you choose a location for your printer, be sure that:

- **it sits on a stable, strong table**
- **there is air circulation on all sides, including the bottom**
- **you remove all the packing material before you use the printer.**

If you are just setting up your Star LS-5 Series, and have not read Chapter 2, please take the time to read the section "2.2 Installing the Toner Cartridge". It is vital that you handle and install this component very carefully.

In addition to the front paper tray, various types of paper can be fed into the printer using the paper feeder unit with universal cassette, that is provided as standard. It is available for use with A4, Letter, Executive, and B5. You can purchase a Legal Cassette or Envelope Cassette as an option.

The printer's on-off switch (power switch) is located on the left side of the printer.

4.2 CONTROL PANEL

The front panel of the printer provides information about the printer's status. It also allows you to program it for your (and your computer's) specific needs. The Star LS-5 Series Laser Printer works in two basic modes when the printer is off-line:

Normal mode
Program mode

The buttons have different functions in each mode:

BUTTON	*Normal Mode*	*Program Mode*
[ON LINE]	When light is lit the printer can print. When light is off all other buttons are enabled.	Fast exit (termination) of Program Mode (returns to Printer Ready)
[PRINT]	Print information in its memory	No function
[ERROR SKIP/<]	Continue printing or display error code	Display next item within current level of menu selections
[TEST/ >]	Initiate tests	Display previous item within current level of menu selections
[RESET/∨]	Discard information	Display next level within current item of menu selection. When in last level of current item, executes function
[PROGRAM/∧]	Enter program mode or select default setting	Display previous level within current item of menu selection
[FEEDER SELECT]	Select paper source for printing	No function
[MODE]	Select the mode to be stored in current and initial setting	No function

Remember: You enter (by pressing (∨)) or exit (by pressing (∧)) a Level to select the previous (by pressing (>)) or next (by pressing (<)) Item within a Group.

There are indicator lights on the front panel. When lit they mean:

ON LINE (green) — the printer is ready for printing
PRINT (green) — the printer is printing information
DATA (green) — information has been received, but not yet printed
READY (green) — the printer is ready for printing or for programming
ALARM (orange) — an error condition exists and the printer is off-line.

4.2.1 Basic Operation

There are four basic operations performed from the control panel:

- On Line and Off Line — The printer can receive information from the computer and print it only when it is on-line. When the printer is on-line, the ON LINE light will be lit. For all other functions, the printer must be off-line. This is accomplished by pressing the (ONLINE) button, the ON LINE light will go out.
- Page eject — The printer may have unprinted information in its memory. This is indicated by the lit DATA indicator. To eject it from the printer, take the printer off-line. Then press (PRINT). When the remaining information is printed, the paper will be ejected and the DATA light will go out.
- Error Skip — In case of an error, the printer will go off-line and stop printing. If the error is minor, it is possible to continue printing. To do this, press (ERROR SKIP), then (ONLINE) until the ON LINE light is on. If the error was minor, printing will resume. If the error was more serious, the panel will provide information on how to handle it.
- Reset — To clear the printer's memory and restore settings to the power-up settings, press (RESET).

Before you begin printing, it is a good idea to test the printer. To do this, take the printer off-line. Then press and hold (TEST) until the display reads Status Sheet. The printer will provide a status sheet showing:

- its configuration
- an example of text printing, and
- a summary of its settings — initial, power-up preset and an alternate setting.

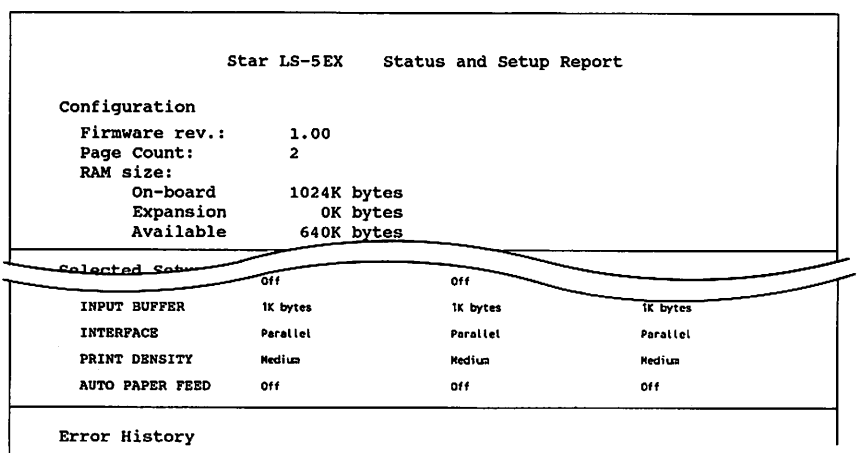
4.3 CONNECTING THE PRINTER TO THE COMPUTER

The Star LS-5TT Laser Printer comes equipped with a standard Centronics parallel interface, an AppleTalk interface, and an RS-232 serial interface. The Star LS-5EX Laser Printer comes equipped with the same interfaces; however, the AppleTalk interface is not active unless the optional TrueImage Board is installed. The parallel and serial interface can be connected simultaneously, though only one can be active at any one time.

Use a parallel interface when your printouts contain large amounts of graphic data or frequently transferring soft fonts to the printer. A parallel interface is faster than a serial interface, but the cable length from the printer to the computer is limited to 10 feet.

Use an RS-232 serial interface when you need to locate your printer more than 10 feet (and up to 50 feet) from your computer and are most often sending text with very little graphic data.

The printer comes from the factory pre-set with the Centronics parallel interface active. You can confirm this by looking at the Interface Group portion of the sample print.



Star LS-5EX Status and Setup Report

Configuration

Firmware rev.:	1.00
Page Count:	2
RAM size:	
On-board	1024K bytes
Expansion	0K bytes
Available	640K bytes

Selected Setup			
	Off	Off	
INPUT BUFFER	1K bytes	1K bytes	1K bytes
INTERFACE	Parallel	Parallel	Parallel
PRINT DENSITY	Medium	Medium	Medium
AUTO PAPER FEED	Off	Off	Off

Error History

This means that the Centronics parallel interface is active. If the serial port were active, that line would state serial.

If you are going to use a Centronics interface, you don't need to make any changes. If you want to use an RS-232 interface, you must change the settings.

4.3.1 Selecting the Serial Interface

- Take the printer off-line by pressing the (ONLINE) button until the ON LINE light is off.
- Then press (PROGRAM).
- Press (<) until the display reads

```
PROGRAM MODE
INTERFACE
```

- Press (V). Now the screen will read

```
INTERFACE
Parallel        @
```

- Now press (<). The screen will change to

```
INTERFACE
Serial
```

- With the display reading "Serial", this time press (V). The screen will show

```
Serial
BAUD RATE
```

- Pressing (V) now displays

```
BAUD RATE
9600 baud       @
```

- Press (<) to display a series of options, from 300 to 38400. Keep pressing until the one you want appears on the screen.
- Pressing (V) now displays

```
BAUD RATE
9600 baud       @
```

- Then press (^) displays `BAUD RATE`. Pressing (<) displays these options on the second line of the display screen:

```
DATA BIT
PARITY
STOP BIT
PROTOCOL
ROBUST-XON
DTR POLARITY
```

The settings from the factory for these options are:

8 data bits
No parity
1 stop bit
DTR
High

Whenever you want to change any of the serial parameters, follow the same sequence as for selecting the baud rate. For example, to change the data bit, at "`Serial`" press (V) then (<) until `DATA BIT` is displayed on the screen. Pressing (V) will display the first option, and (<) will give the rest of them. Press (V) when your choice appears on the screen. Finally, press (ONLINE) to exit the Program Mode and prepare the Star LS-5 Series Printer for printing.

If your applications program requires the XON/XOFF handshake ("software" rather than DTR "hardware"), set it from the "`Serial`" menu by

- Pressing (V) then (<) until you see

```
Serial
PROTOCOL
```

- Pressing (V) displays

```
PROTOCOL
DTR              @
```

- Pressing (<) displays

```
PROTOCOL
XON/XOFF
```

- Press (V) to select XON/XOFF. The display should indicate

```
PROTOCOL
XON/XOFF         @
```

4.3.2 Selecting the Auto Selection

The "Auto Selection" function for the interface is useful when you want to use the printer with both the parallel and serial interfaces. The printer automatically detects which interface the computer is sending data to, and uses that interface. To select the "Auto Selection", do this:

- Take the printer off-line by pressing the (ONLINE) button until the ON LINE light is off.
- Then press (PROGRAM).
- Press (<) until the display reads

```
PROGRAM MODE
INTERFACE
```

- Press (V). Now the screen will read

```
INTERFACE
Parallel        @
```

- Now press (<) until you see

```
INTERFACE
Auto selection
```

- Press (V). The screen will read

```
Auto selection
BAUD RATE
```

- Select the serial interface parameters to match the conditions for the computer and the printer.
- Finally, press (ONLINE) to exit the Program Mode and prepare the Star LS-5 Series Printer for printing.

4.4 RESOLUTION ENHANCEMENT PROCEDURE

The Resolution Enhancement sharpens the print quality of characters by "smoothing" the fine gradations along the edge of the character.

- Take the printer off-line by pressing the (ONLINE) button.
- Then press (PROGRAM) to enter the program mode.
- Press (<) until the display screen reads

```
PROGRAM MODE
REP
```

- Press (V). Now the screen will read

```
REP
Off                @
```

- Press (<) to display

```
REP
On
```

- Press (V) to select it. The display will read

```
REP
On                 @
```

- Pressing (ONLINE) will allow the Star LS-5 Series Printer to use the resolution enhancement procedure.

4.5 PAPER FEED

The Star LS-5 Series Printer can feed paper automatically either from the cassette or from the front paper tray. You can select the paper feed source and designate the size of paper fed from the front tray using the Program Mode or the (FEEDER SELECT) button.

4.5.1 Feeder Selection

The factory default of feeder is Cassette Only. To change this setting with the Program Mode, put the printer off-line, and press (PROGRAM).

- Press (<) until the screen displays:

```
PROGRAM MODE
PAPER FEED
```

- Press (V), and the screen will now display:

```
PAPER FEED
FEEDER
```

- Press (V), which will display

```
FEEDER
Cassette Only  @
```

- Pressing (<) displays these options on the second line of the display screen:

```
Auto Selection
Cassette
Lower Cassette
Front Tray
Manual
```

- Press (<) to display

```
FEEDER
Front Tray
```

- Press (V) to select "Front Tray". The screen will display

```
FEEDER
Front Tray      @
```

- Finally, press the (ONLINE) button to exit the Program Mode and prepare the Star LS-5 Series Printer ready for printing.

If you get a paper jam while printing, refer to "7.6 Paper Jamming" for ways to clear the machine.

4.5.2 Paper Size

The factory default of Front Tray is A4 paper. If you want to use a different size of paper or envelopes, you must first program the printer. After going off-line and pressing (PROGRAM):

- Press (<) until the screen reads

```
PROGRAM MODE
PAPER FEED
```

- Press (V), which will display

```
PAPER FEED
FEEDER
```

- Pressing (<) displays

```
PAPER FEED
FRONT TRAY SIZE
```

- Press (V), which will display

```
FRONT TRAY SIZE
Paper: A4       @
```

- Pressing (<) repeatedly will list the other choices on the second line of the display screen.

```
Paper: Letter
Paper: Legal
Paper: A4
Paper: Executive
Paper: B5
ENV: Monarch
ENV: COM-10
ENV: Intntnl DL
ENV: Intntnl C5
```

- Press (V) when the required paper/envelope size is displayed on the screen.
- Finally, press the (ONLINE) button to exit the Program Mode and prepare the Star LS-5 Series Printer ready for printing.

Before you start printing, refill the tray with the appropriate paper.

4.6 PRINTING IN LANDSCAPE ORIENTATION

If you want to change from portrait to landscape orientation for your printed page, follow this procedure, after going off-line and pressing (PROGRAM):

- Press (<) until you get

  ```
  PROGRAM MODE
  LAYOUT
  ```

- Press (V), which will display

  ```
  LAYOUT
  ORIENTATION
  ```

- Press (V) for

  ```
  ORIENTATION
  Portrait        @
  ```

- Pressing (<) gives

  ```
  ORIENTATION
  Landscape
  ```

- Pressing (V) selects Landscape. The screen will display

  ```
  ORIENTATION
  Landscape       @
  ```

- Finally, press the (ONLINE) button to exit the Program Mode and prepare the Star LS-5 Series Printer ready for printing.

4.7 PRINT DENSITY

The print density is set to "Medium" as the factory default. If you want to change the print density, follow this procedure:

- Take the printer off-line by pressing the (ONLINE) button. The ON LINE indicator light will go off.
- Then press the (PROGRAM) button to enter the program mode. The screen will display

```
PROGRAM MODE
NUMBER OF COPIES
```

- Press (<) until the display reads

```
PROGRAM MODE
PRINT DENSITY
```

- Press (V). Now the screen will read

```
PRINT DENSITY
Medium        @
```

- Pressing (<) displays these options on the second line of the display screen:

```
Dark
Semi Dark
Medium
Semi Light
Light
```

- Press (V) when the required density is displayed on the screen. A "@" symbol should then appear next to your Print Density selection.
- Finally, press the (ONLINE) button to exit the Program Mode and prepare the Star LS-5 Series Printer ready for printing.

4.8 SAVING THE SETTING

The new setting will remain in the printer's RAM memory until the power is turned off. You should understand that there are four different types of settings stored in the printer's memory.

- The FACTORY SETTINGS, which are those put into the printer's unchangeable ROM memory at the factory.
- The POWER-UP SETTINGS, which the user can create, then store in a permanent memory called EEPROM, even after the power is turned off. The Mode 1 settings will override the Factory Settings, being activated when the printer is turned off, then on again. The Mode 2 settings can be recalled from the control panel.
- The INITIAL SETTINGS, which the user can create and use as long as the printer is not turned off. These are stored in temporary or volatile RAM memory. They override the Power-up Settings.
- The CURRENT SETTINGS, which are those stored in temporary RAM memory. These may be issued by software commands that override all other settings.

To make the settings permanent, you must save it in EEPROM! Perform this programming sequence, after taking the printer off-line.

- Press (PROGRAM).
- Press (<) until the screen displays

```
PROGRAM MODE
SET USER DEFAULT
```

- Press (V), after which the screen will display

```
SET USER DEFAULT
Mode 1          @
```

- Press (<) when you want to store the new setting to Mode 2.
- Press (V) when the desired mode is selected. Now the screen will briefly display

```
SET USER DEFAULT
EEPROM LOAD DONE
```

- Finally, press (ONLINE). Your new settings are now saved.

4.9 RETURNING TO FACTORY SETTINGS

If for some reason you want to start from the beginning, with the original factory settings, follow this procedure:

- In the Program Mode, press (<) until the screen reads

```
PROGRAM MODE
LOAD FACTORY SET
```

- Press (V). The screen will display

```
LOAD FACTORY SET        or      LOAD FACTORY SET
EC Set          @               US Set          @
```

- Press (<) when you select the other one.
- Press (V). The screen will display briefly

```
LOAD FACTORY SET
LOAD FROM ROM OK
```

then

```
PROGRAM MODE
LOAD FACTORY SET
```

The factory settings are now restored, and you can go on-line for other activities.

4.10 SELECTING DISPLAY LANGUAGE

The LCD screen can display its messages and prompts in either English, French, German, Italian or Spanish. To select the display language, turn off the printer and follow the procedure below.

- Hold down the (RESET) button and turn on the printer (make sure that the (RESET) button is held at least until the screen displays "SELECT LANGUAGE"). The bottom line on the screen will display "ENGLISH" after powers up.
- Pressing the (ERROR SKIP) or (TEST) button changes the language displayed on the screen.
- Press (RESET) button and then (ONLINE) button after selecting the desired language. The language will be saved and the printer will go into on-line mode.

If the (ONLINE) button is pressed before depressing the (RESET) button, the printer will go on-line and the display language will remain as it was.

MEMO

Font Selection

CHAPTER 5

The Star LS-5EX Laser Printer includes fourteen built-in Bitmap fonts and eight built-in IntelliFnt Scalable fonts.

The Star LS-5TT Laser Printer includes an additional 35 built-in PostScript and TrueType compatible Scalable fonts.

Bitmap fonts are made of tiny dot-by-dot patterns in pre-defined sizes. Bitmap fonts have a fixed point size, pitch and symbol set attributes.

Scalable fonts are created within the printer on a character-by-character basis ensuring high speed and print quality. In virtually limitless sizes, fonts can be scaled from 3 points to 999.75 points in quarter-point increments.

5.1 PRINTING A FONT LIST

To print a font list, follow this procedure:

1. Press and hold (TEST) button until the display reads

   ```
   FONT LIST
   ```

2. Release the button. The printer will print a font list in both portrait and landscape orientations.

5.2 SELECTING FONTS

You can select any of the internal (resident), cartridge or permanent downloadable soft fonts using your application software, printer commands, or from the control panel.

Follow the instructions below to select fonts from the control panel.

1. Take the printer off-line by pressing the (ONLINE) button until the ON LINE light is off. Then press (PROGRAM)
2. Press (<) until the display reads

   ```
   PROGRAM MODE
   CHARACTER
   ```

3. Press (V). Now the screen will read

   ```
   CHARACTER
   SOURCE: R
   ```

4. If you want to select cartridge font or soft font, press (<) until the display reads

   ```
   CHARACTER
   SOURCE: C        (for Cartridge font)
   ```

   or

   ```
   CHARACTER
   SOURCE: S        (for Soft font)
   ```

5. Now, press (V). The screen will change to

   ```
   SOURCE: R
   NUMBER: 1
   ```

6. Press (<) until the selected number appears on the second line of the display.
7. Press (V). Depending on the selected font type, the second line of the screen will read

   ```
   POINT: 10.00     (Scalable font with proportional spacing is
                     selected)
   PITCH: 12.00     (Scalable font with fixed spacing is selected)
   Roman-8          (Bitmap font is selected)
   ```

8. When a Scalable font is selected, press < or > until the desired point or pitch is shown on the second line of the display. Then press V.
9. Press < until your requested symbol set shows on the second line of the display.
10. Finally, press ONLINE to exit from the Program Mode and prepare the Star LS-5 Series Printer for printing.

MEMO

Maintaining the Star LS-5 Series Printer

CHAPTER 6

The Star LS-5 Series Laser Printer does not require much care and maintenance. However, it is important to perform a few cleaning tasks to maintain your printer in good condition. This chapter will explains procedures for replacing the toner cartridge, handling the toner cartridge and printer, and cleaning the printer.

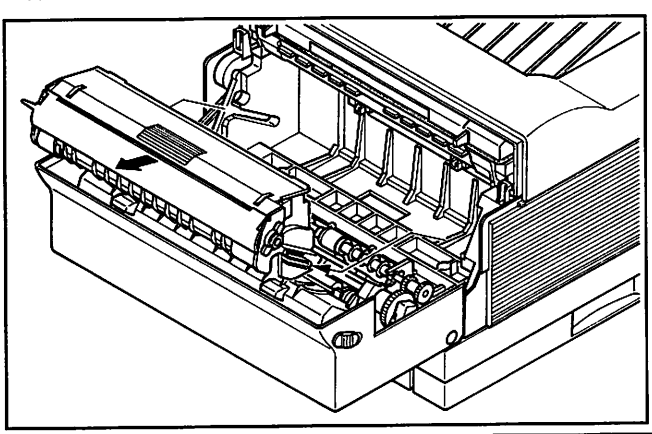
6.1 REPLACING THE TONER CARTRIDGE

Replace the toner cartridge in the following cases:

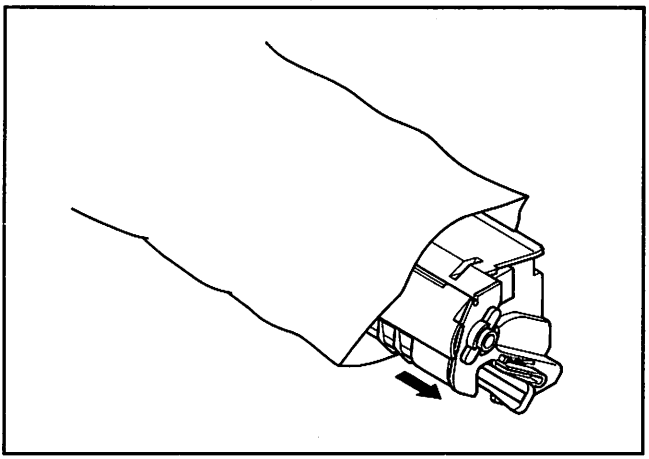
- If print quality is still low, even after you have redistributed the toner by removing the cartridge and rocking it gently from end to end about five or six times.
- If transparency films show stain problem at either the top or bottom of the films.

Follow the instructions below to replace the toner cartridge.

1. Open the front cover as described in "2.1.5 Opening and Closing the Printer".
2. Pull out the used toner cartridge and dispose it in the proper manner.
   NOTE: Keep the toner cartridge horizontally to avoid scattering leftover toner.

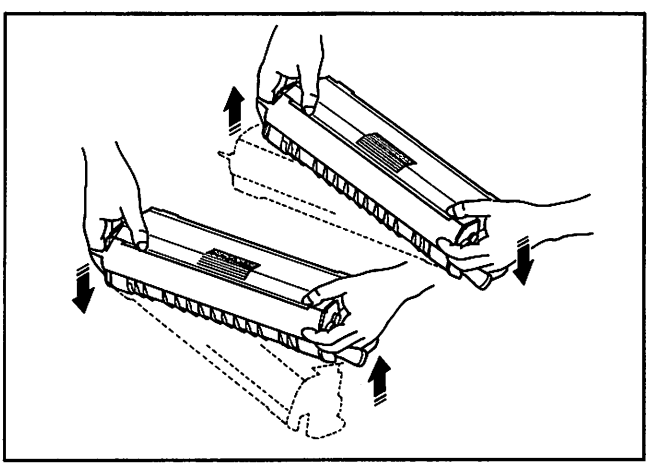


3. Open the box containing the new toner cartridge and remove the packing material from the toner cartridge.
4. Open the aluminum bag containing the toner cartridge and remove it.

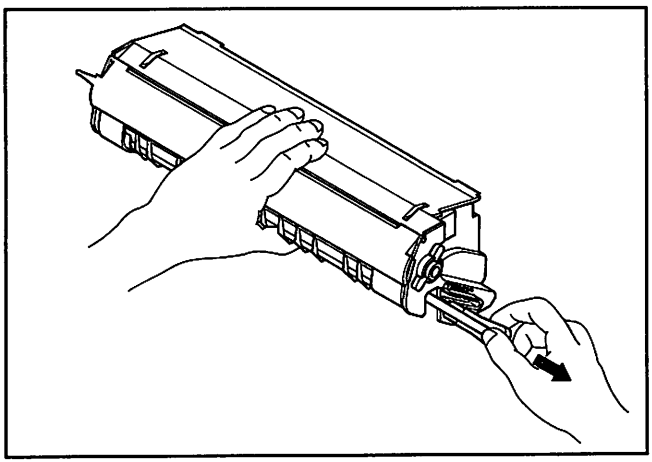


NOTE: Save the aluminum bag, as you may need it for storing the cartridge when you move the printer to another place in the future.

5. Holding the cartridge with both hands, rock it gently from end to end, 7 or 8 times, to distribute the toner evenly. If the toner is not distributed evenly in the cartridge, it may adversely affect print quality.

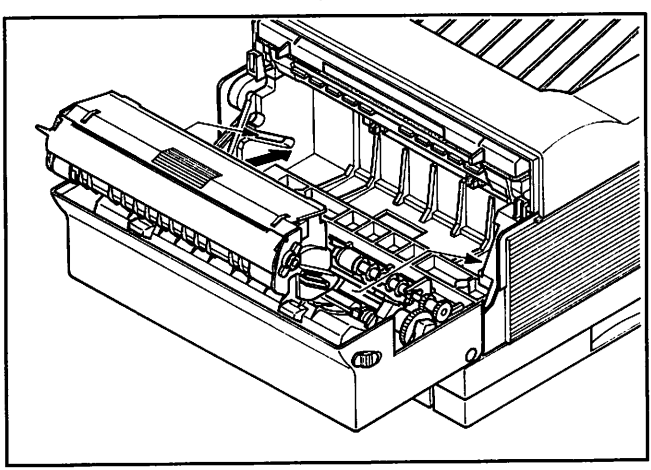


6. Place the cartridge on a flat surface. While holding down the cartridge with one hand, use the other hand to pull the tab to remove the seal.

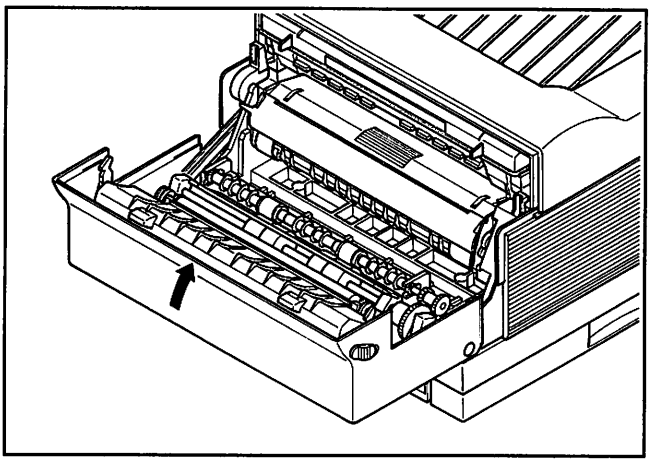


Make sure that the tab is pulled smoothly in a direction parallel to the flat surface. Otherwise, the tape may break or snap, making the cartridge unusable.

7. Align the guides on the toner cartridge (marked by an orange line) with the guides inside the printer (marked by an orange arrow) and gently slide the cartridge into position.
NOTE: Do not touch rollers and gear inside the printer.



8. Make sure that the cartridge is securely seated, then close the cover gently.



6.2 PRECAUTIONS FOR THE TONER CARTRIDGE

The toner cartridge contains both the photosensitive drum and toner used for printing. Since the drum is extremely sensitive to the light, it may be permanently damaged if it is exposed to the direct sunlight or strong light. Caked or unevenly distributed toner may result in poor print quality. Therefore, always observe the following rules:

- Always keep the toner cartridge in the aluminum bag in which it was originally packed. And do not open the bag until you are ready to install it in the printer.
- Do not store the cartridge where it will be exposed to direct sunlight.
- Store the cartridge with the label facing up. Do not turn it upside down or stand it on end.
- Store the cartridge at a temperature of between 0°C and 35°C (32°F and 95°F).
- Do not store the cartridge in salty air, or where there are corrosive gases such as ammonia.
- Keep the cartridge away from CRTs, disk drives and floppy disks. The magnetic force in the cartridge can adversely affect them.
- Always keep the cartridge away from children.
- Be sure to use the cartridge before its expiration date. Otherwise, print quality will be affected.
- Dispose of a used toner cartridge as a noninflammable.

When handling the toner cartridge, also pay attention to the following points, in addition to the above.

- Do not touch the bottom of the cartridge when handling the cartridge.
- Do not open the drum protective shutter. If it is opened, print quality may be affected.

6.3 CLEANING THE EXTERIOR OF THE PRINTER

Before cleaning, make sure that the power cord is removed.

Use only water and neutral detergent to remove marks and spots from the printer, then wipe the printer dry with a soft dry cloth. Use of any other cleaning solution may damage the printer.

The printer does not require lubrication. Never attempt to lubricate any internal or external parts of the printer. Otherwise, lubrication may affect the operation of the printer and damage the printer.

Troubleshooting

CHAPTER 7

An important key to reliable operation of your Star LS-5 Series Printer is knowing how to respond when trouble occurs. Some problem conditions can be handled on the spot by the printer operator. Others require servicing by trained personnel. This chapter will explain when to do what. It will also help you deal with the paper jamming and other operational problems.

7.1 ERROR MESSAGES DISPLAYED ON THE SCREEN

The control panel screen may display a variety of messages during the course of operation of the Star LS-5 Series Printer. You are already familiar with the display sequence during power-up, and when programming the printer. Some messages provide information about the paper supply in the cassette or the condition of the toner cartridge. Others have to do with fonts or emulations.

Another way of considering errors is that some of them result from failures in hardware or software. Other errors are functional, meaning that either the printer operator or the host computer has commanded the controller to perform an operation that is beyond its designed capabilities.

If the printer malfunctions for some reason, warning messages will appear on the screen, recommending what action you should take. The most serious are messages that tell you to call for repair service. Some messages concern less serious conditions that can handled by the printer operator. Information messages relate a communication problem with the host computer, but do not affect the printer's operation. These messages are summarized here.

7.2 SERVICE CALL MESSAGES

7.2.1 Engine Service Call Messages

Engine service call messages are related to the interface with engine. They can result from either a communication failure, or a halt in the engine's ready level.

Message	*Meaning*	*Action*
CALL SERVICE 01	fixing assy error	processing stops; alarm beeps; press (ERROR SKIP) to reset engine and recheck
CALL SERVICE 03	scanner motor malfunction	processing stops; alarm beeps; press (ERROR SKIP) to reset engine and recheck
CALL SERVICE 04	improper communication	processing stops; alarm beeps; turn off the power then on to reset engine and recheck
CALL SERVICE 20	NVM error	processing stops; alarm beeps; turn off the power then on to reset engine and recheck

7.2.2 Controller Service Call Messages

Controller error messages result from failure in either hardware or software. Some controller error messages occur during startup tests. The messages mean that the controller is malfunctioning, but is still able to display the error message. Certain conditions can also be detected during controller reset, on insertion of a cartridge, and at other times after the completion of power-up initialization. An error stops the test sequence, the unit goes off-line, and the alarm sounds. The controller will attempt to recover, if possible. If the problem is not found during initialization, but recurs during operation, most likely the fault is in the hardware.

Message	*Meaning*	*Action*
CALL SERVICE 05	CRC error in controller main ROM program	program halts; fatal
CALL SERVICE 06	CRC error in resident font ROM	program halts; fatal
CALL SERVICE 07	read/write test error in on-board RAM	program halts; fatal
CALL SERVICE 08	read/write test error in expansion RAM	sequence stops; alarm beeps; shut off power and fix problem; or press (ERROR SKIP) to continue, in which case the expansion RAM will be ignored
CARTRIDGE BAD	CRC error in Cartridge (if installed)	sequence stops; alarm beeps; shut off power and fix problem; or press (ERROR SKIP) to continue, in which case the cartridge will be ignored
CALL SERVICE 10	CRC error in EEPROM	sequence stops; alarm beeps; shut off power and fix problem; or press (ERROR SKIP) to continue, in which case program uses factory settings as power-up settings
CALL SERVICE 11	read/write test error in EEPROM	sequence stops; alarm beeps; shut off power and fix problem; or press (ERROR SKIP) to continue, in which case program uses factory settings as power-up settings
NO FONT PRESENT	no font present	program halts; fatal

7.3 OPERATOR CALL MESSAGES

Whenever the screen displays operator call messages, the printer goes off-line and the alarm sounds. The problem is one that the operator should be able to resolve. After making any correction, you should press (ERROR SKIP) to recheck the status. If the error is not displayed again, you may continue printing straight away (if the error was one of the Engine Problems below). If the error message was of any other type, you should press (ONLINE) before continuing the print job.

7.3.1 Engine Problems

These are mechanical problems that prevent the engine from being ready to print.

Message	*Meaning*	*Action*
CASS: REFILL ??? (??? means the current page size)	cassette is current feeder; out of paper	printing stops; refill paper
LCAS: REFILL ??? (??? means the current page size)	optional lower cassette is current feeder; out of paper	printing stops; refill paper
TRAY: REFILL ??? (??? means the current page size)	front paper tray is current feeder; out of paper	printing stops; refill paper
LOAD ??? CASS. (??? means the current page size)	cassette is current feeder; no cassette in slot	printing stops; install the cassette
LOAD ??? LCAS. (??? means the current page size)	optional lower cassette is current feeder; no cassette in slot	printing stops; install the cassette
CLOSE COVER	cover is open	close the cover
PAPER JAMMING	paper is jammed	follow printer procedure in "7.6 Paper Jamming"
SET EP CARTRIDGE	no toner cartridge	install the toner cartridge

7.3.2 Font Cartridge Problems

The font cartridge is plugged into the printer. It should not be inserted or withdrawn while the DATA LED is continuously lit. If someone does this, the screen will indicate "CARTRIDGE ERROR". The printer must be reinitialized by turning off the power and then on again.

If a font cartridge is removed while the DATA LED is blinking, the screen will display "REINSERT CART". In this case, the operator must insert the font cartridge or press (ERROR SKIP). If (ERROR SKIP) is pressed, the printer will select the closest font.

Message	*Meaning*	*Action*
CARTRIDGE ERROR	Font cartridge is removed while DATA LED is on	Turn the power off then on again to initialize the printer
REINSERT CART.	Font cartridge is removed while DATA LED is blinking	insert the cartridge or press (ERROR SKIP)

7.3.3 Optional Hardware

The following messages will be displayed if necessary optional hardwares (e.g. RAM expansion board) have been removed.

Message	*Meaning*	*Action*
INSUFFICIENT RAM	full page mode is selected; no expansion RAM installed	repower-up with expansion RAM board, or press (ERROR SKIP)
INSUFFICIENT RAM	full page mode and REP is selected; 1 MB expansion RAM installed	repower-up with 2MB (or more) expansion RAM board, or press (ERROR SKIP)
NO EMUL. BOARD	emulation of the board is selected; no emulation board installed	repower-up with the emulation board, or press (ERROR SKIP)

7.3.4 Change Paper Size

Certain emulations permit page size to be specified by the host computer. Also, page size can be selected from the menu. If a change in page size is required, the screen will display a message to that effect. The alarm will beep and the printer will go off-line. You may have the printer ignore such a message by pressing (ERROR SKIP). (In this case, the printer will print the page size image on the different size paper.) If the current feeder is cassette, inserting the correct paper cassette causes the printer to start printing automatically. If the current feeder is the front paper tray, changing the front paper tray size via panel starts printing automatically.

Message	*Meaning*	*Action*
CASS:CHANGE ???	the paper size (indicated with ???) is required; cassette	follow procedure above
LCAS:CHANGE ???	the paper size (indicated with ???) is required; optional cassette feeder	follow procedure above
TRAY:CHANGE ???	the paper size (indicated with ???) is required; front paper tray	follow procedure above

7.3.5 Manual Paper Feed

Certain emulations permit specifying manual paper feed from the host computer. Also, you may select manual feed from the menu. The following message tell you to hand feed paper of a specific size. The alarm beeps and the printer goes off-line. When you feed the appropriate paper into the front paper tray and press (ONLINE), the message will be turned off and printing will continue. The operator has the option of pressing (ERROR SKIP), which turns off the message and causes the printer to continue printing.

If there is no paper in the front paper tray, pressing (ERROR SKIP) turns off the message and causes the printer to feed paper from cassette and then displays the message again.

Message	*Meaning*	*Action*
M-FEED ???	the paper size (indicated with ???) is required to be hand fed	follow procedure above

7.4 OPERATOR INFORMATION MESSAGES

7.4.1 Host Communication Problem

Certain problems with communication with the host computer may be detected. Messages listed below provide information, but do not halt the printing process. The printer uses a default value if necessary. You may remove the message by pressing (ERROR SKIP). Note that if there are multiple errors, the last one detected is displayed.

Message	*Meaning*	*Action*
LINE ERROR	parity error in host data	follow procedure above
INPUT OVERFLOW	input buffer overflow	follow procedure above
BAD FONT DATA	downloaded font bad	downloaded font ignored
BAD FONT CODE	downloaded font in error	downloaded font ignored
BAD CHAR CODE	loaded character outside of index	downloaded font ignored

7.4.2 Function or Size Incompatibility

There are problems that occur when the host computer requests a function not provided or a function that requires more memory than is available.

Message	*Meaning*	*Action*
PAGE OVERFLOW	page buffer memory overflow	partial page currently composed is printed and ejected; remaining data for page is printed on next sheet
OVERRUN ERROR	data too complex to print	printable data of the page will be lost
CANNOT ROTATE	insufficient memory to rotate font	font rotation aborted; printing continues using closest available font
CANNOT DOWNLOAD	insufficient memory to download font	font download is aborted; printing continues using closest available font
CHAR NOT IN FONT	received character not in currently selected font	blank space is printed for that character

7.4.3 Font Cartridge

The font cartridge is plugged into the printer. The operator may insert or withdraw a cartridge only when the DATA LED is off or blinking. The following message acknowledges the change.

Message	*Meaning*	*Action*
CART. CHANGED	font cartridge is inserted or removed when DATA LED is off or blinking	message will remain for one second
REINSERT CART.	Font cartridge is removed while DATA LED is blinking	insert the cartridge or press (ERROR SKIP)

7.5 STATUS MESSAGES

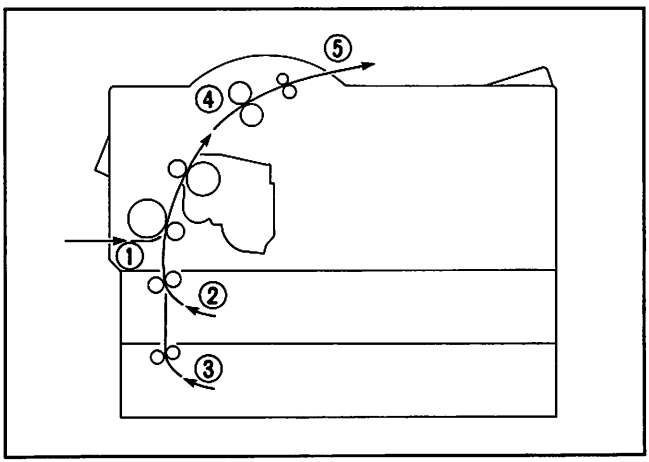
Status messages are low priority messages that either indicate normal conditions or provide warnings that need not be acted upon immediately. These conditions should not occur when the printer is on-line. If they do, however, the alarm will beep and the printer will go off-line. For some conditions however, there is the possibility of a condition occurring when the printer is on-line. If it does, the alarm will not sound and the printer will remain on-line.

Message	*Meaning*	*Action*
PRINTER WARMUP	printer is warming up but service call not necessary	—
ENGINE TEST	operator has initiated a test of the printing	test in progress
ENGINE RESET	engine is being reset	—
REINITIALIZE	controller soft initialization	occurs when (RESET) is pressed or emulation is changed; may also occur when printer is on-line if emulation is changed
STATUS SHEET PRINTING	status sheet printout	occurs when (TEST) is held for at least 2 but less than 4 seconds
FONT LIST PRINTING	font list printout	occurs when (TEST) is held at least 4 seconds in HP emulation and TrueImage mode
TEST PAGE PRINTING	sample page printout	occurs when (TEST) is held at least 6 seconds in TrueImage mode
REPRINT LOST PGS	retransmission of lost sheets	may occur after paper jamming
PRINTER READY	all conditions normal and proper but printer is not operation; no unused data in controller or pages in printing	
PRINTER ACTIVE	all conditions normal and proper; printer is in operation; unused data in controller or pages in printing	

7.6 PAPER JAMMING

As paper travels from the front paper tray or cassette through the printing area and is ejected, it can jam at the following locations:

①Paper pick-up area (front paper tray)
②Paper pick-up area (cassette paper feeder)
③Paper pick-up area with optional cassette paper feeder
④Fixing assembly area
⑤Print delivery area

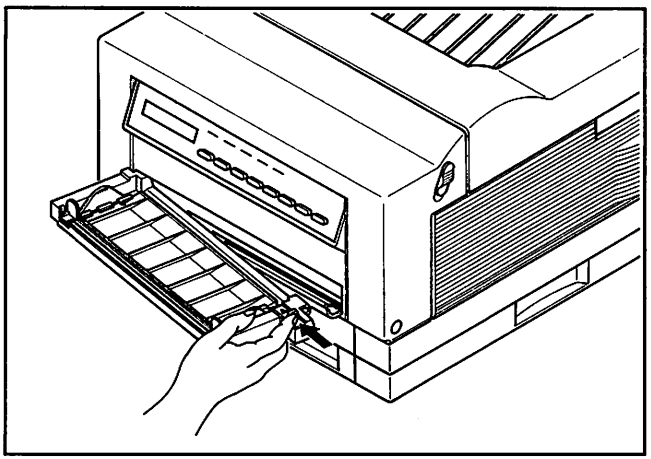


Common causes of paper jams are as follows. Remove them to prevent paper jams.

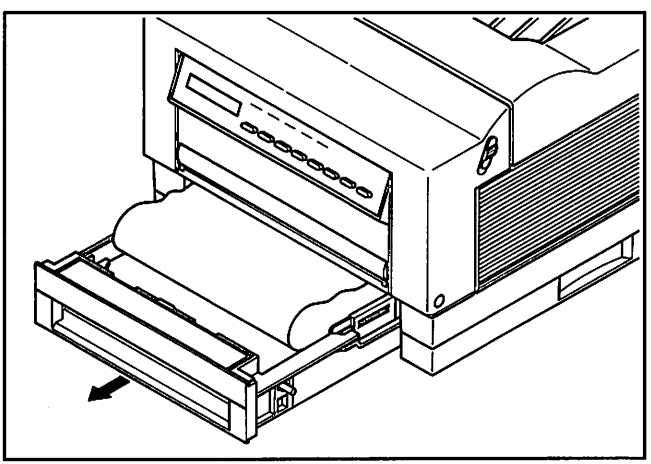
- The printer is not located on a firm, level surface which is fairly vibration-free.
- Paper may not be correct for the printer.
  Refer to "2.3.1 Selection of Paper" for the detailed information of paper specifications.
- Transparencies and envelopes may not be fanned before using.
- Paper may not be loaded correctly on a paper cassette or the front paper tray.
  Refer to "2.3.2 Loading Paper into the Front Paper Tray" or "2.3.3 Loading Paper into the Paper Cassette" for detailed information of paper loading.

Follow the procedures below to clear the paper jam.

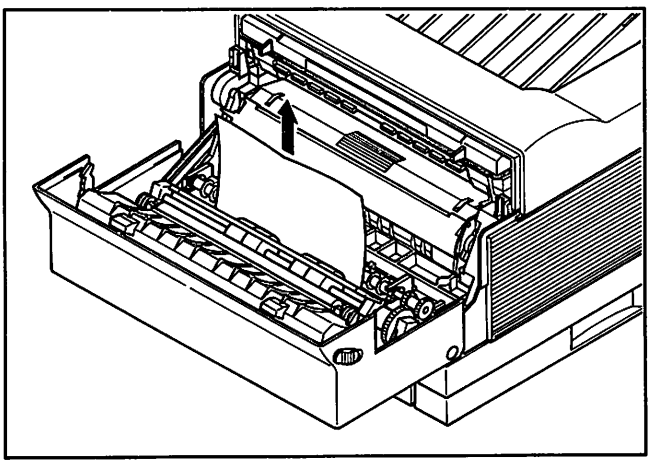
1. Remove any paper from the front paper tray, and remove the front paper tray.



2. Pull out the cassette and check the paper pick-up area. If there is a paper jam here, remove the jammed paper before replacing the cassette.
   NOTE: Remove the wrinkled paper in the paper cassette and make sure that paper is loaded in the paper cassette properly.



3. Release the side latches to open the front cover.
4. Remove the jammed paper carefully so as not to tear it.



CAUTION:

- Do not touch the fusing area as shown above, because it gets hot.
- Do not throw strong light inside to avoid damaging the toner cartridge.
- Do not touch the transfer roller.
- Make sure that paper fragments are not left inside.

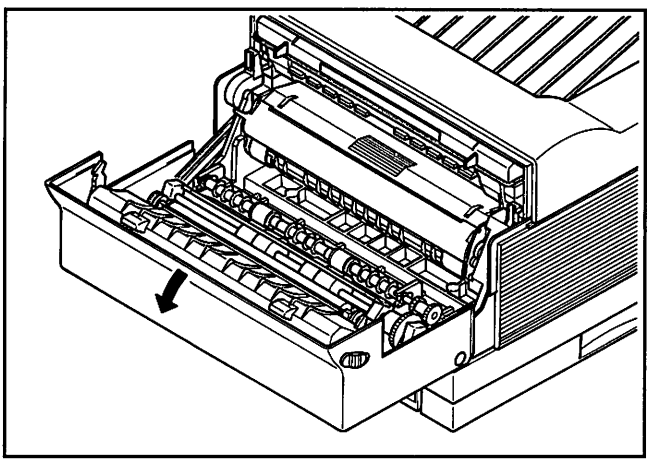
5. After checking all the areas described here, close the front cover, replace the front paper tray (if it is being used) and refill paper. Printing will restart.

7.7 STREAKY PRINTS

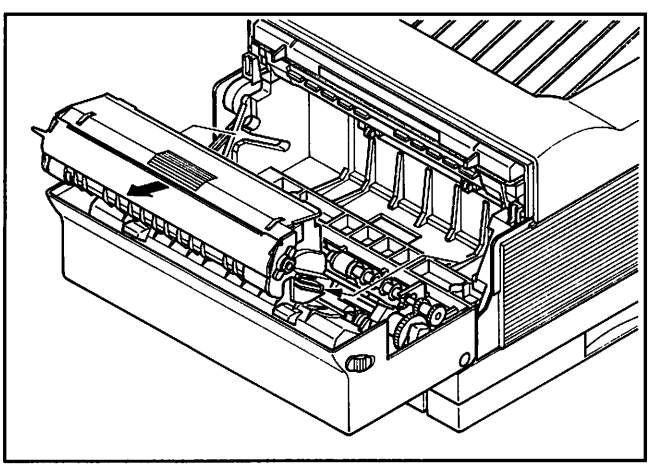
7.7.1 White Streaks

White streaks occur if the toner level is low and the toner inside the toner cartridge is not distributed evenly. They can be eliminated by re-distributing the toner.

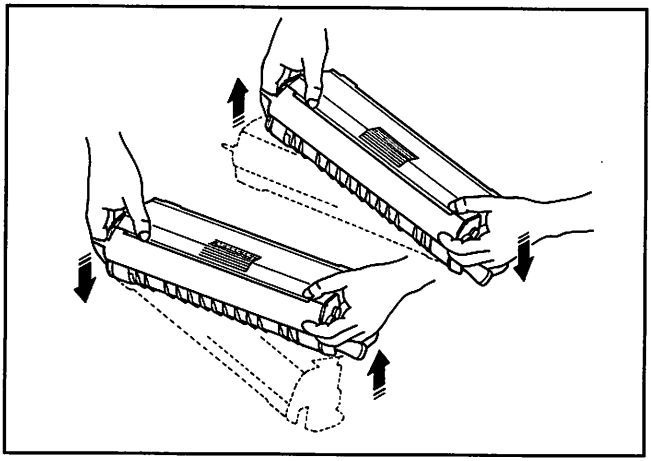
1. Leave the printer power on to prevent data corruption during a print operation. Remove any paper in the front paper tray and remove it. Release side latches and open the front cover.



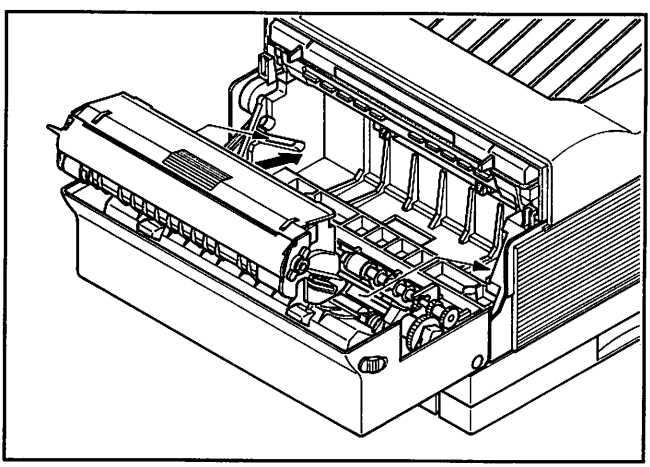
2. Remove the toner cartridge from the printer.



3. Holding the cartridge with both hands, rock it gently from end to end, 7 or 8 times, to distribute the toner evenly.



4. Replace the toner cartridge in the printer, then close the front cover.



If vertical white streaks still appear after the toner inside the cartridge has been re-distributed, the cartridge needs to be replaced. See "6.1 Replacing the Toner Cartridge" for replacing the cartridge.

7.7.2 Stains on Transparency Films

Transparency films may sometimes show stains at either the top or bottom of the films. These stains may be caused by a dirty paper path or the flaw on the toner cartridge.

- Clean the fixing assembly. The fixing roller inside the fixing assembly may have been stained with toner. Print out several sheets of blank paper. If the stains still appear, use a different type of transparency film.
- Replace the toner cartridge. The photosensitive drum in the cartridge may have been damaged due to exposure to the bright light. For replacing the cartridge, see "6.1 Replacing the Toner Cartridge".

Options

CHAPTER 8

The following optional accessories are available with the Star LS-5 Series. This chapter describes how to install and use these optional accessories.

- Feeder unit
- Cassette
- Expansion RAM board
- RAM module
- Font cartridge
- TrueImage board for LS-5EX

8.1 FEEDER UNIT AND CASSETTE

The optional feeder unit is used with one of the optional paper cassettes, to feed paper from the paper cassette into the printer. The feeder unit can be attached easily to the bottom of the printer.

Model	*Type*
FU-25XA-UN	250 sheet feeder unit with Universal Cassette
FU-50XA-A4	500 sheet feeder unit with A4 Cassette
FU-50XA-LT	500 sheet feeder unit with Letter Cassette

Cassettes are available in the following paper sizes: A4, Letter, Legal, B5, Executive and Envelope. Each cassette can hold up to 250 sheets of plain paper (paper weight: 80 g/m^2), and the envelope cassette holds about a 27mm stack of envelopes or about 30 envelopes. In addition, different type of the A4, Letter and B5 cassettes can hold up to 500 sheets.

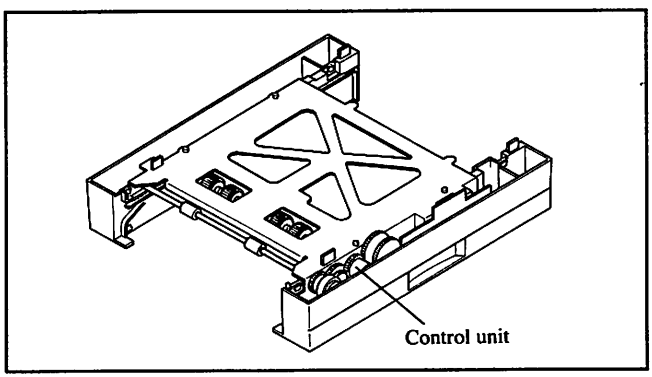
Types and sizes of paper can be used with the cassettes are listed below.

Cassette Type	Type	Size	Weight
Universal Cassette	Plain paper Labels Transparency films	A4 Letter B5 Executive A4 Letter A4 Letter	60 g/m² to 105 g/m²
Legal Cassette	Plain paper	Legal Letter	60 g/m² to 105 g/m²
Envelope Cassette	Envelope	COM-10 MONARCH DL C5	60 g/m² to 105 g/m²
A4 Cassette (500 Sheet)	Plain paper	A4	60 g/m² to 105 g/m²
Letter Cassette (500 Sheet)	Plain paper	Letter	60 g/m² to 105 g/m²
B5 Cassette (500 Sheet)	Plain paper	B5	60 g/m² to 105 g/m²

Setting Up

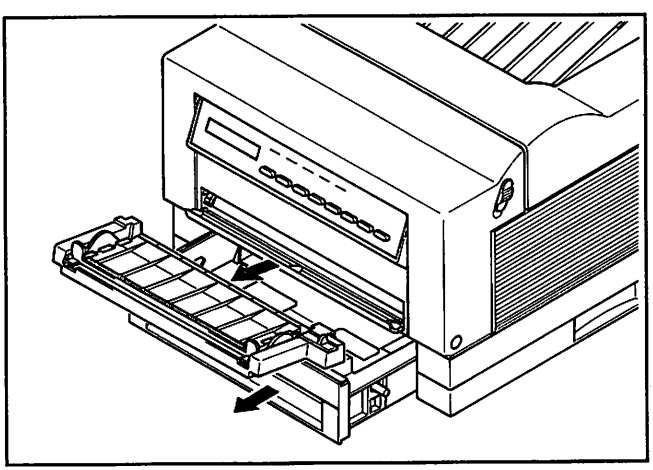
Attaching an optional feeder unit requires a wide space. Choose a wide and flat surface near the installed printer. After attaching a feeder unit to the printer, return the printer to the installation place.

1. Unpack the feeder unit and put it on a wide and flat surface. Remove the paper cassette if it is installed.
   NOTE: Leave enough space to put your fingers inside both the front and rear of the feeder unit.

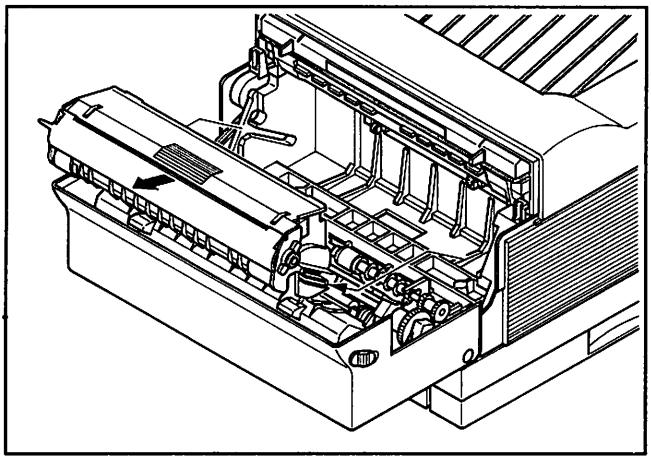


CAUTION: Do not touch the control unit. It is easy to be broken.

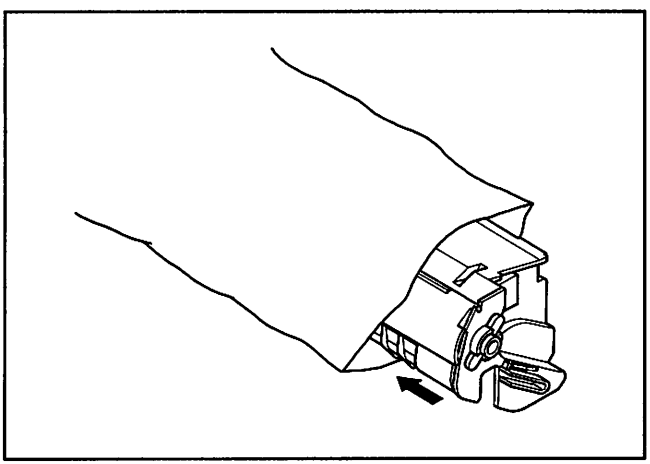
2. Turn the printer power off and remove the power cord from both the printer and the outlet.
3. Remove the paper cassette from the printer and the front paper tray if it is installed.



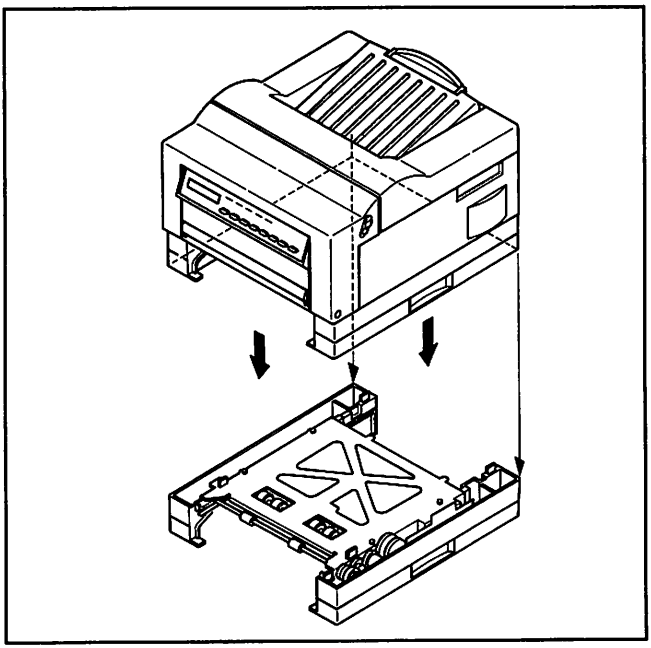
4. Release the side latches and open the front cover. Then remove the toner cartridge from the printer.



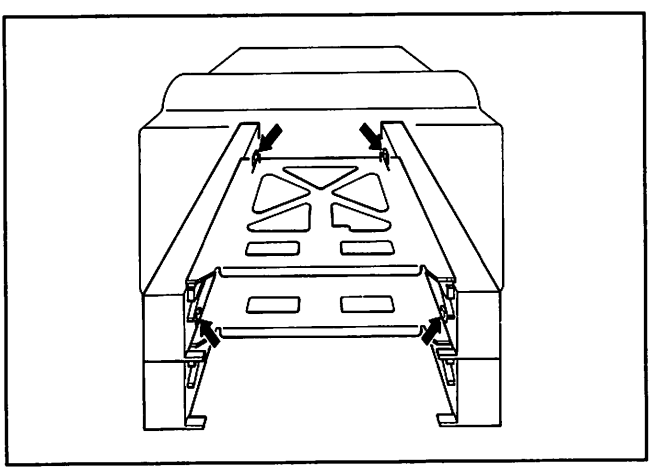
5. Replace the toner cartridge in the aluminum bag in which it was originally packed, or cover with a thick cloth to protect it from direct light.



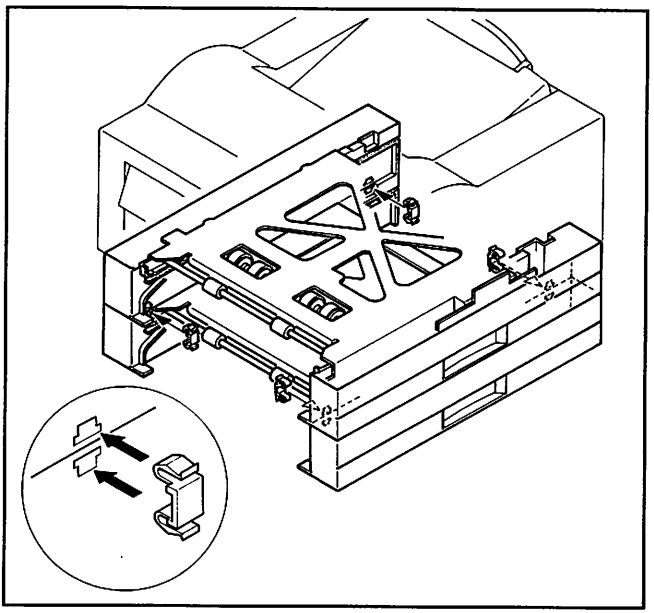
6. Put the printer on the feeder unit by holding the hollows of both sides of the printer. Make sure the corners of the printer are aligned with on those of the feeder unit exactly.



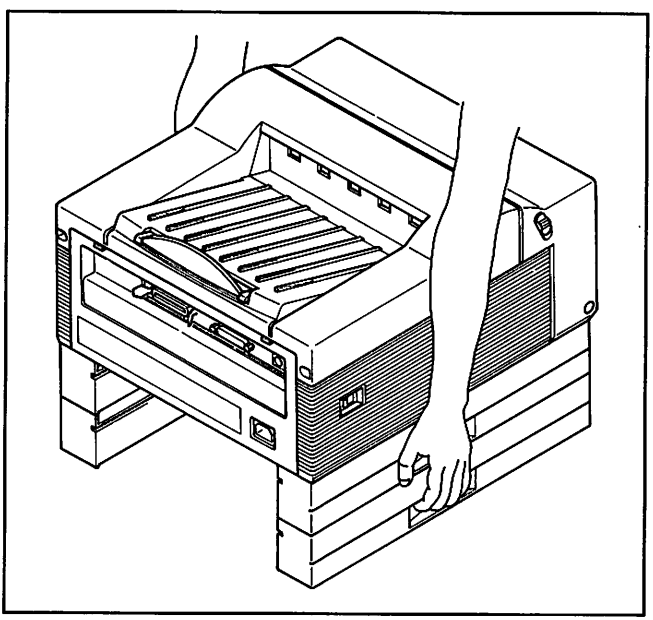
7. Make sure the four projections fit into the four holes.
   If all the projections do not fit into the holes, lift the printer and put it on the feeder unit again.



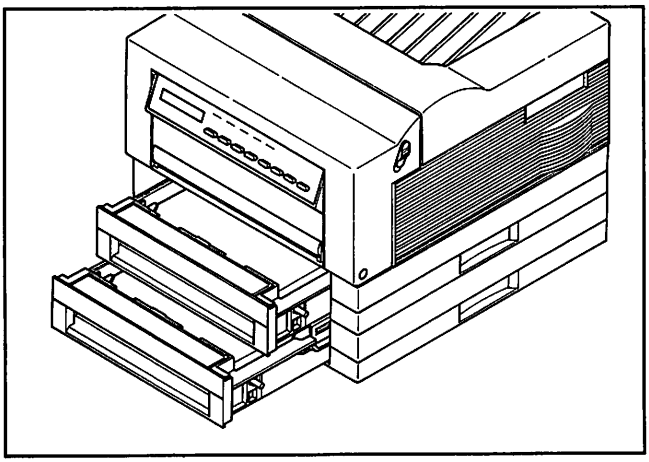
8. Insert four plastic clips securely into the four holes until they click.



9. Move the printer with a feeder unit to the installation place.
   Hold the printer with your fingers in the hollows of the feeder unit.



10.Insert the toner cartridge and two paper cassettes loaded with paper.



Now, you are ready to use the optional feeder unit. Connect the power cord and turn on the printer.

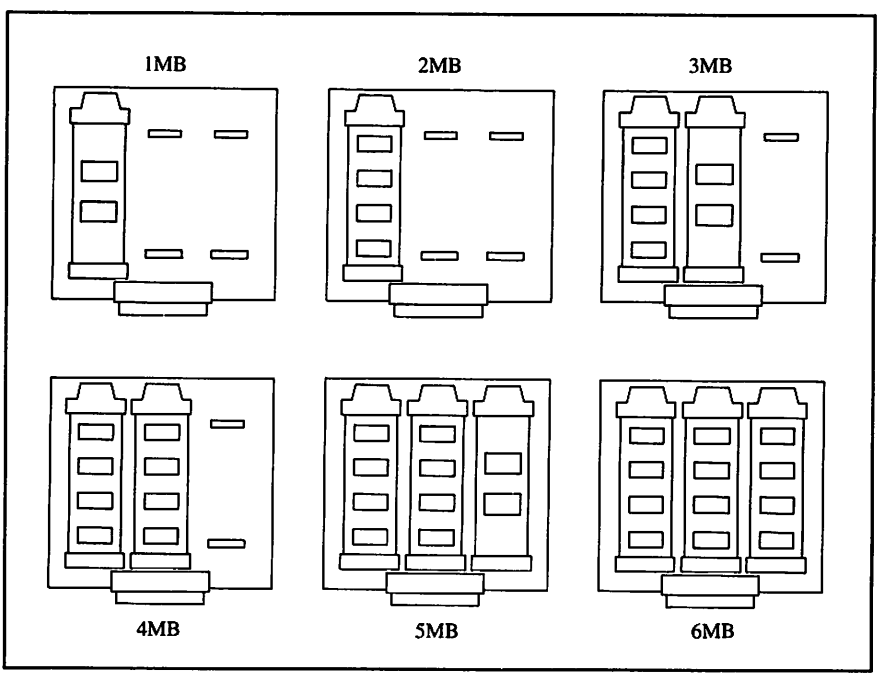
8.2 EXPANSION RAM BOARD AND RAM MODULE

The Star LS-5EX printer has 1 MB memory and the Star LS-5TT has 2 MB memory as standard. You can expand this memory by installing the optional expansion RAM board.

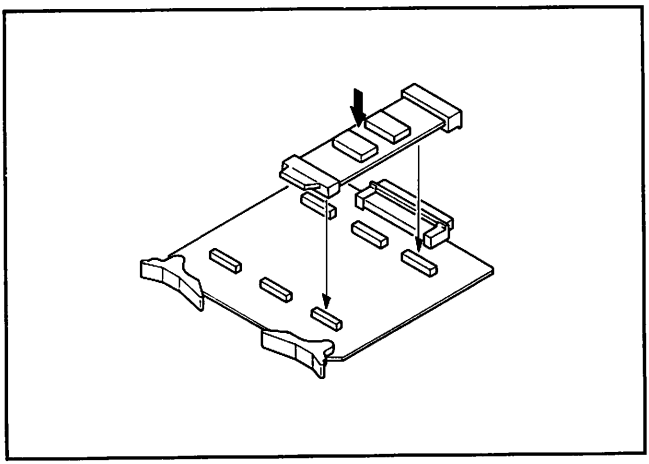
The expansion RAM board has either 1MB memory or 2MB memory. You can add the memory size up to 6 MB by installing the RAM module on the board.

8.2.1 Installing the RAM Module on the Board

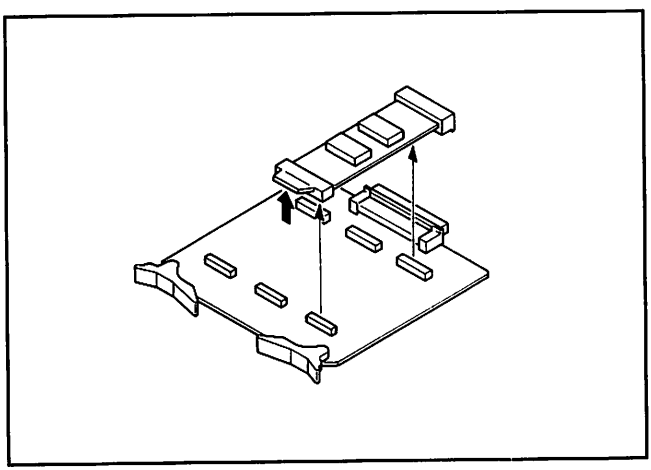
There are two types of RAM module: 1 MB Module and 2 MB Module. There are three positions (banks) for the RAM Module on the board, and they are assigned an installing order, as shown below.



To install the module, align the connectors on both the board and the module, then slide it all the way in.



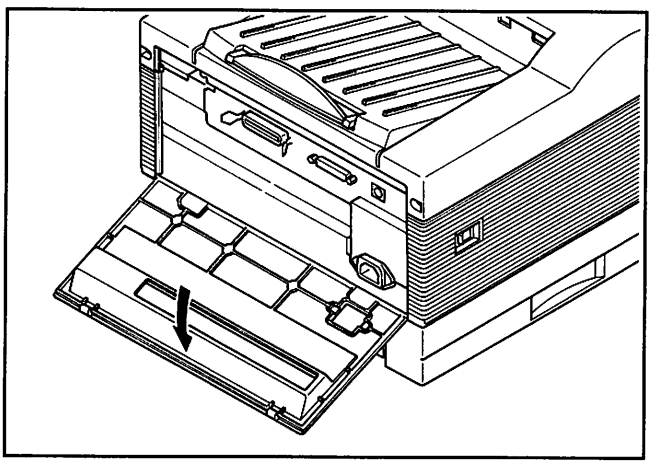
To remove the module, pull the tab on the module to disconnect the connector.



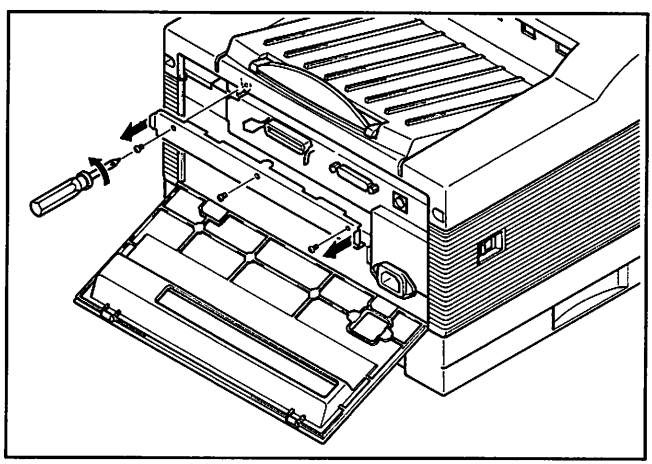
8.2.2 Installing the RAM Board into the Printer

When you have finished installing the RAM module on the board, follow the procedures below to fit the RAM board into the printer.

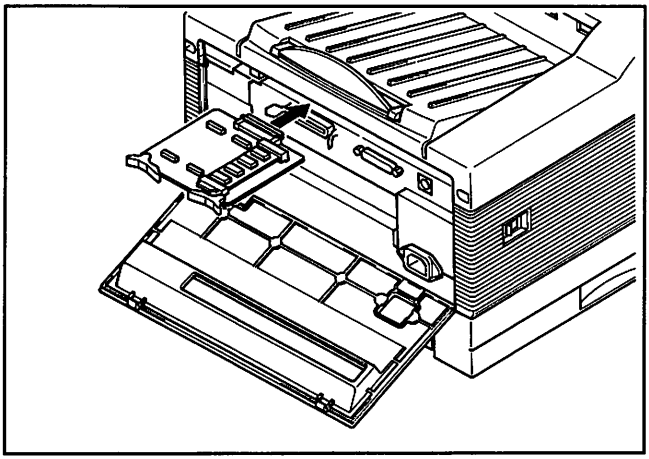
1. Turn the printer power off and remove the power cord from both the printer and the outlet.
2. Remove the interface cable from both the printer and the computer.
3. Open the rear cover as shown below.



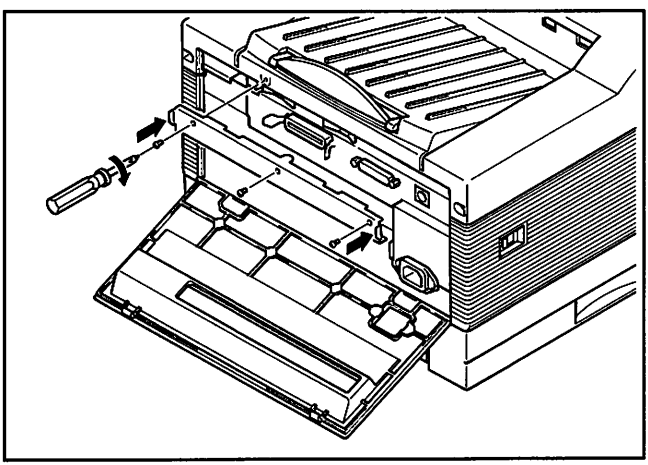
4. Remove the metal plate above the interface connectors using a philips-type screwdriver.



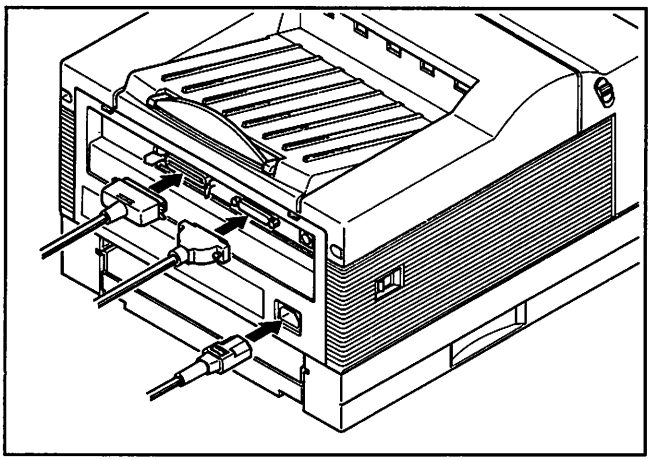
5. Insert the board into the left side, then slide it all the way in.



6. Remount the metal plate in place and secure it with three screws.



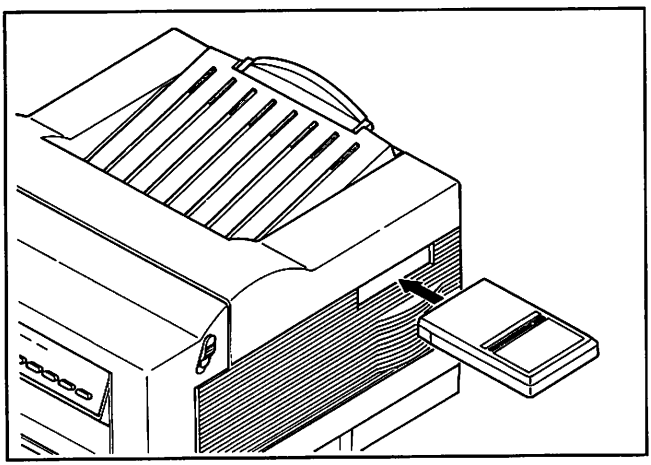
7. Close the rear cover, and connect the interface cable and the power cord to the printer.



8.3 FONT CARTRIDGE

Fonts can be added to the printer by installing an optional Font Cartridge. The Font Cartridge is installed in the slot on the right side or the printer.

Insert the Font Cartridge with the arrow label facing up. If the Font Cartridge is inserted upside down, the cartridge and/or printer may be damaged.

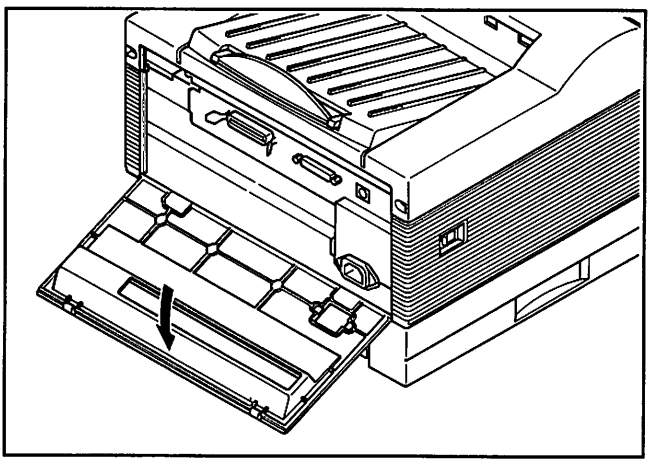


8.4 TRUEIMAGE BOARD

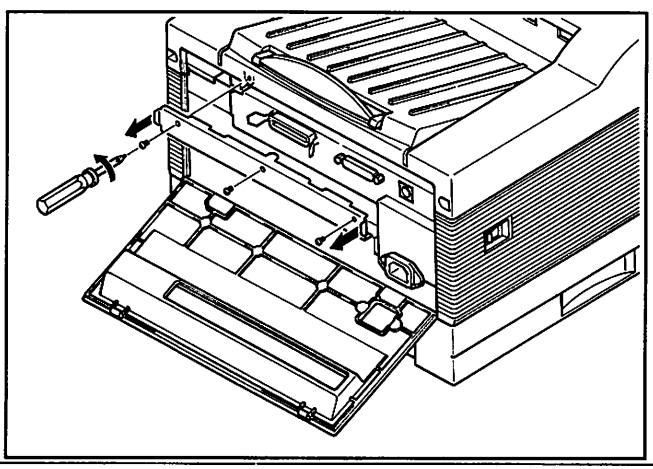
You can select the TrueImage mode with the Star LS-5EX printer by installing the optional Page Description Language (PDL) Board, and an optional Expansion RAM Board (at least 1MB expansion).

Follow the procedures below to install them.

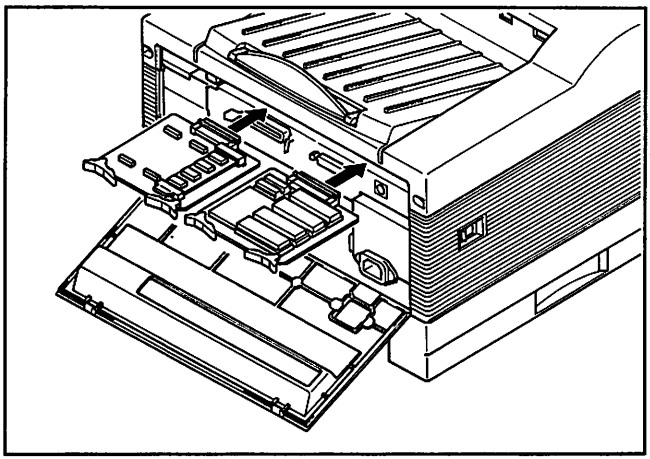
1. Turn the printer power off and remove the power cord from both the printer and the outlet.
2. Remove the interface cable from both the printer and the computer.
3. Open the rear cover as shown below.



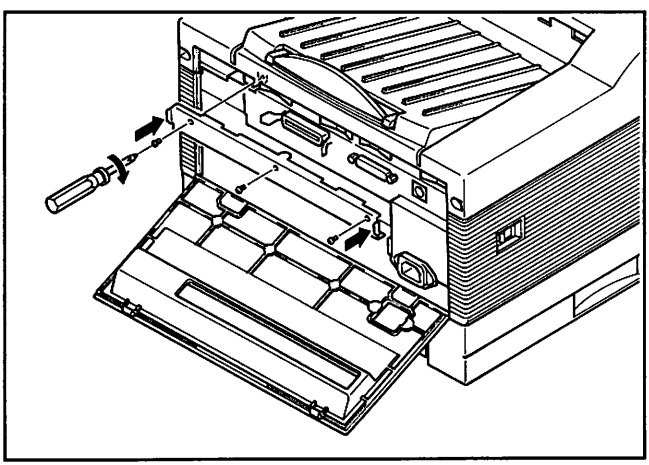
4. Remove the metal plate above the interface connectors using a philips-type screwdriver.



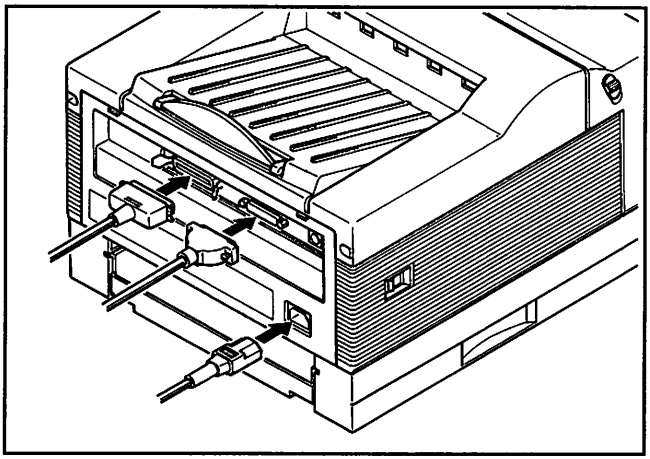
5. Insert the RAM board into the left side and the TrueImage board into the right side, then slide them all the way in.



6. Remount the metal plate in place and secure it with three screws.



7. Close the rear cover, and connect the interface cable and the power cord to the printer.



Reference

CHAPTER 9

9.1 SPECIFICATIONS

- Type
  Laser beam page printer
- Engine

Resolution:	300 × 300 dots per inch
Speed:	5 pages per minutes for A4 size
Warm up:	under 1 minute (at 20°C or 68°F)

- Emulation

LS-5EX:	Standard: PCL 5 and GL/2 (HP LaserJet III) Option: TrueImage (with optional PDL board)
LS-5TT:	PCL 5 and GL/2 (HP LaserJet III) TrueImage (Apple LaserWriter NTX)

- RAM

Resident:	1 megabyte (LS-5EX) 2 megabyte (LS-5TT)
Optional:	Max. 6 megabytes on RAM Expansion Board

- Host Interface

Serial:	RS-232C
Parallel:	Centronics
AppleTalk:	Standard for LS-5TT Optional for LS-5EX with PDL Board

- Default Settings: Changeable using the control panel
- Fonts

Resident:	14 bitmap fonts 8 scalable fonts 35 TrueType scalable fonts (LS-5TT only)
Option:	Font cartridges

- Paper feeding: Front paper tray
  Cassette feed
- Paper size
  - Plain paper: Letter, A4, Executive, B5
  - Envelope: COM-10, Monarch, DL, C5
  - Labels: A4, Letter
  - Transparency films: A4, Letter
- Paper weight (plain paper)
  - Front paper tray: 60 g/m^2 to 135 g/m^2
  - Cassette feed: 60 g/m^2 to 105 g/m^2
- Printing area
  Requires a marign of 4mm from each edge of the paper
- Acoustic noise (in accordance with ISO 7779)
  - Stand by: 37 dB or less
  - Printing: 45 dB or less
- Environment
  - Operating: 5°C to 35°C (41°F to 95°F)
    15 to 85% relative humidity, no condensation
  - Storage: –20°C to 40°C (4°F to 104°F)
    5 to 95% relative humidity, no condensation
- Power source: 100/115V (50/60Hz) for North America and Japan
  200/240V (50Hz) for Europe, Asia, and Oceania
- Power consumption: less than 450W (100/115V) or 500W (200/240V)
- Weight: Approx. 12kg
- Dimensions: 352 mm × 393.5 mm × 253 mm
- Options: Feeder Unit (250 Sheet Type, 500 Sheet Type)
  Paper Cassette (Universal, A4, Letter, Legal, B5, Envelope)
  Expansion RAM Board (1 MB, 2 MB)
  Expansion RAM Module (1 MB, 2MB)
  Font cartridge
  TrueImage Board (For LS-5EX)

9.2 RELIABILITY

- Suggested monthly print volume
  3000 prints
- Definition of failure
  Any loss of operation that requires calling a service person.
  Operation errors and installation failures are not included.
- Product life
  Five years or 150,000 prints, whichever comes first
- MPBF
  120,000 pages
- Mean time to repair
  30 minutes or less
- Paper feed reliability

	Paper Jam	Multifeed
A4/Letter	1/5000	1/800
Others	1/2000	1/500

- Toner cartridge life
  8,000 prints at 2.8% print duty (A4/Letter size)

9.3 PIN FUNCTIONS ON INTERFACES

• Paralle interface

Pin No.	Signal Name	Direction	Function
1	$\overline{\text{STROBE}}$	IN	Goes from High to Low (for at least 0.5 microseconds) when data are valid.
2	DATA1	IN	Eight-bit character data. DATA8 is the most significant bit; DATA1 is the least significant bit. High is logic 1 and Low is logic 0.
3	DATA2	IN	
4	DATA3	IN	
5	DATA4	IN	
6	DATA5	IN	
7	DATA6	IN	
8	DATA7	IN	
9	DATA8	IN	
10	$\overline{\text{ACK}}$	OUT	A low pulse acknowledges receipt of data.
11	BUSY	OUT	Low when the printer is ready to accept data.
12	PAPER OUT	OUT	Goes High if the printer runs out of paper.
13	SELECTED	OUT	High when the printer is on line
14~15	N/C		Unused
16	SIGNAL GND		Signal ground.
17	CHASSIS GND		Printer's chassis ground, isolated from signal ground.
18	+5VDC	OUT	External supply of +5VDC
19~30	GND		Twisted pair return signal ground level.
31	$\overline{\text{RESET}}$	IN	Low input resets the printer to its power-on condition.
32	$\overline{\text{ERROR}}$	OUT	Goes low to signal that the printer cannot print due to an error condition.
33~36	N/C		Unused

• Serial interface

Pin No.	Signal Name	Direction	Function
1	GND	—	Chassis ground.
2	TXD	OUT	Carries data from the printer.
3	RXD	IN	Carries data to the printer.
4	RTS	OUT	On when the printer is ready to receive data.
5~6	N/C		Unused.
7	GND	—	Signal ground.
8~19	N/C		Unused.
20	DTR	OUT	On when the printer is ready to receive data.
21~25	N/C		Unused.

9.4 COMMAND SUMMARY

This section shows the summary of the commands that work with the Star LS-5 Series Printer. For details of those functions, refer to the optional Applications Manual.

9.4.1 Printer Control Language (PCL) Commands

Job control commands

Command	Function
<ESC> E	Reset
<ESC> & *ℓn* H	Paper source
<ESC> & *ℓn* X	Select number of copies
<ESC> [C *n*	Select feeder
<ESC> [E *n*	Change emulation

Page definition commands

Command	Function
<ESC> & *ℓn* A	Page size
<ESC> & *ℓn* O	Logical page orientation
<ESC> & *ℓn* P	Page length
<ESC> & *ℓn* U	Left offset registration
<ESC> & *ℓn* Z	Top offset registration
<ESC> [O *n*	Select orientation
<ESC> [S *n*	Select paper size

Margins and line spacing commands

Command	Function
<ESC> & a *n* L	Set left margin
<ESC> & a *n* M	Set right margin
<ESC> & k *n* H	Horizontal motion index
<ESC> & *ℓn* C	Vertical motion index
<ESC> & *ℓn* D	Set line spacing
<ESC> & *ℓn* E	Top margin
<ESC> & *ℓn* F	Text length
<ESC> & *ℓn* L	Perforation skip
<ESC> 9	Clear horizontal margins

Positioning the cursor

Command	Function
<BS>	Backspace
<HT>	Horizontal tab
<LF>	Line feed
<FF>	Form feed
<CR>	Carriage return
<SP>	Space
<ESC> & a *n* C	Horizontal cursor position (columns)
<ESC> & a *n* H	Horizontal cursor position (decipoints)
<ESC> & a *n* R	Vertical cursor position (rows)
<ESC> & a *n* V	Vertical cursor position (decipoints)
<ESC> & f *n* S	Push/pop cursor position
<ESC> * p *n* X	Horizontal cursor position (dots)
<ESC> * p *n* Y	Vertical cursor position (dots)
<ESC> =	Half line feed

Miscellaneous output commands

Command	Function
<ESC> & a *n* P	Print direction
<ESC> & k *n* G	Line termination
<ESC> & s *n* C	End of line wrap
<ESC> Y	Display functions on
<ESC> Z	Display functions off
<ESC> z	Self test

Font selection commands

Command	Function
<SO>	Select secondary font
<SI>	Select primary font
<ESC> & d @	Turn underlining off
<ESC> & d *n* D	Turn underlining on
<ESC> & p *n* X *<character data>*	Transparent print data
<ESC> (*n*	Select primary font symbol set
<ESC> (*n* X	Select primary font by ID number
<ESC> (3 @	Set primary font to default values
<ESC> (s *n* B	Select primary font stroke weight

<ESC> (s *n* H	Set primary font pitch
<ESC> (s *n* P	Select primary font spacing type
<ESC> (s *n* S	Select primary font style
<ESC> (s *n* T	Select primary font typeface
<ESC> (s *n* V	Set primary font point size
<ESC>) *n*	Select secondary font symbol set
<ESC>) *n* X	Select secondary font by ID number
<ESC>) 3 @	Set secondary font to default values
<ESC>) s *n* B	Select secondary font stroke weight
<ESC>) s *n* P	Select secondary font spacing type
<ESC>) s *n* H	Set secondary font pitch
<ESC>) s *n* S	Select secondary font style
<ESC>) s *n* T	Select secondary font typeface
<ESC>) s *n* V	Set secondary font point size

Creating and downloading fonts

Command	**Function**
<ESC> * c *n* D	Font ID
<ESC> * c *n* E	Send character code
<ESC> * c *n* F	Font control
<ESC> (s *n* W *<descripter and data>*	Send character descripter and data
<ESC>) s *n* W *<descripter>*	Send font descripter

Graphics commands

Command	**Function**
<ESC> * b *n* M	Set compression mode
<ESC> * b *n* W *<data>*	Transfer raster data
<ESC> * b *n* Y	Set raster y-offset
<ESC> * c *n* A	Set rectangle width in dots
<ESC> * c *n* B	Set rectangle height in dots
<ESC> * c *n* G	Set area fill identity
<ESC> * c *n* H	Set rectangle width in decipoints
<ESC> * c *n* P	Draw filled rectangle
<ESC> * c *n* V	Set rectangle height in decipoints
<ESC> * r B	End raster transfer

<ESC> * r *n* A	Start raster transfer
<ESC> * r *n* F	Set raster image orientation
<ESC> * r *n* S	Set raster area width
<ESC> * r *n* T	Set raster area height
<ESC> * t *n* R	Set raster resolution
<ESC> * v *n* N	Set source transparency
<ESC> * v *n* O	Set pattern transparency
<ESC> * v *n* T	Set pattern type

Macro commands

Command	**Function**
<ESC> & f *n* X	Macro control
<ESC> & f *n* Y	Macro ID

9.4.2 GL/2 Commands

Set-up commands

Command	Function
<ESC> % *n* A	Enter PCL mode
<ESC> % *n* B	Enter GL/2 mode
<ESC> * c 0 T	Set picture frame ancher point
<ESC> * c *n* K	Specify horizontal plot size
<ESC> * c *n* L	Specify vertical plot size
<ESC> * c *n* X	Set picture frame horizontal size
<ESC> * c *n* Y	Set picture frame vertical size

Configuration and status group

Command	Function
DF	Default values
IN	Initialize
IP	Input scaling points
IR	Input relative scaling points
IW	Input window
PG	Advance full page
RO	Rotate coordinate system
RP	Replot
SC	Scale

Vector group

Command	Function
AA	Draw absolute arc
AR	Draw relative arc
AT	Draw absolute three point arc
CI	Draw circle
PA	Plot absolute
PD	Pen down
PE	Polyline encoded
PR	Plot relative
PU	Pen up
RT	Draw relative three point arc

Polygon group

Command	Function
EA	Edge absolute rectangle
EP	Edge polygon
ER	Edge relative rectangle
EW	Edge wedge
FP	Fill polygon
PM	Polygon mode
RA	Fill absolute rectangle
RR	Fill relative rectangle
WG	Fill wedge

Line and fill attributes group

Command	Function
AC	Anchor corner
FT	Fill type
LA	Line attributes
LT	Line type
PW	Pen width
RF	Raster fill definition
SM	Symbol mode
SP	Select pen
SV	Screened vectors
TR	Transparency mode
UL	User-defined line type
WU	Select pen width unit

Character group

Command	Function
AD	Define alternate font
CF	Character fill mode
CP	Character plot
DI	Absolute direction
DR	Relative direction
DT	Define label terminator
DV	Define variable text path
ES	Extra space

FI	Select primary font
FN	Select secondary font
LB	Define label
LO	Label origin
SA	Select alternate font
SB	Scalable or bitmap fonts
SD	Define standard font
SI	Set absolute character size
SL	Set character slant
SR	Set relative character size
SS	Select standard font
TD	Transparent data

9.4.3 TrueImage Operators

Stack operators

Operator	Function
clear	Discard all elements
cleartomark	Discard elements down through **mark**
copy	Duplicate top *n* elements
count	Count elements on stack
counttomark	Count elements down to *mark*
dup	Duplicate top element
exch	Exchange top two elements
index	Duplicate arbitrary element
mark	Push mark on stack
pop	Discard top element
roll	Roll *n* elements up *j* times

Maths operators

Operator	Function
abs	Absolute value of num_1
add	num_1 plus num_2
atan	Arctangent of num_1/num_2 in degrees
ceiling	Ceiling of num_1
cos	Cosine of *angle* (degrees)
div	num_1 divided by num_2
exp	Raise *num* to *exponent* power
floor	Floor of num_1
idiv	Integer divide
ln	Natural logarithm (base *e*)
log	Logarithm (base 10)
mod	int_1 mod int_2
mul	num_1 times num_2
neg	Negative of num_1
rand	Generate pseudo-random integer
round	Round num_1 to nearest integer
rrand	Return random number seed
sin	Sine of *angle* (degrees)
sqrt	Square root of *num*
srand	Set random number seed
sub	num_1 minus num_2
truncate	Remove fractional part of num_1

Logical operators

Operator	Function
and	Logical	bitwise and
bitshift	Bitwise shift to *int*1 (positive is left)
eq	Test equal
false	Push boolean value *false*
ge	Test greater or equal
gt	Test greater than
le	Test less or equal
lt	Test less than
ne	Test not equal
not	Logical	bitwise not
or	Logical	bitwise inclusive or
true	Push boolean value *true*
xor	Logical	bitwise exclusive or

Path construction operators

Operator	Function
arc	Append counterclockwise arc
arcn	Append clockwise arc
arcto	Append tangent arc
charpath	Append character outline to current path
clip	Clip using non-zero winding number rule
clippath	Set current path to clipping path
closepath	Connect subpath back to its starting point
currentpoint	Return current point coordinate
curveto	Append Bézier cubic sction
eoclip	Clip using even-odd inside rule
flattenpath	Convert curves to sequences of straight lines
initclip	Set clipping path to device default
lineto	Append straight line to (x, y)
moveto	Set current point to (x, y)
newpath	Initialize current path to be empty
pathbbox	Return bounding box of current path
pathforall	Enumerate current path
rcurveto	Relative **curveto**
reversepath	Reverse direction of current path
rlineto	Relative **lineto**
rmoveto	Relative **moveto**
strokepath	Compute outline of stroked path

Painting operators

Operator	Function
eofill	Fill using even-odd rule
erasepage	Paint current page white
fill	Fill current path with current color
image	Paint monochrome sampled image
imagemask	Paint current color through mask
stroke	Draw line along current path

String operators

Operator	Function
anchorseach	Determine if *seek* is initial substring of *string*
copy	Copy elements of *string*$_1$ to initial substring of *string*$_2$
eq	Test equal
forall	Execute *proc* for each element of *string*
ge	Test greater or equal
get	Get string element indexed by *index*
getinterval	Substring of *string* at *index* for *count* elements
gt	Test greater than
le	Test less or equal
length	Number of elements in *string*
lt	Test less than
ne	Test not equal
put	Put *int* into *string* at *index*
putinterval	Replace substring of *string*$_1$ starting at *index* by *string*$_2$
search	Search for *seek* in string
string	Create string of length *int*
token	Read token from start of *string*

Array operators

Operator	Function
[	Start array construction
]	End array construction
aload	Push all elements of *array* on stack
array	Create array of length *int*
astore	Pop elements from stack into *array*
copy	Copy elements of *array*$_1$ to initial subarray of *array*$_2$

forall	Execute *proc* for each element of *array*
get	Get array element indexed by *index*
getinterval	Subarray of *array* starting at *index* for *count* elements
length	Number of elements in *array*
put	Put *any* into *array* at *index*
putinterval	Replace subarray of *array* starting at *index* by *subarray*

Packed array operators

Operator	**Function**
aload	Push all elements of *packedarray* on stack
copy	Copy elements of $packedarray_1$ to initial subarray of $array_2$
currentpacking	Return array packing mode
forall	Execute *proc* for each element of *packedarray*
get	Get *packedarray* element indexed by *index*
getinterval	Subarray of *packedarray* starting at *index* for *count* elements
length	Number of elements in *packedarray*
packedarray	Create packed array consisting of the specified *n* elements
setpacking	Set array packing mode

Dictionary operators

Operator	**Function**
begin	Push *dict* on dictionary stack
copy	Copy contents of $dict_1$ to $dict_2$
countdictstack	Count elements on dictionary stack
currentdict	Push current dictionary on orerand stack
def	Associate *key* and *value* in current dictionary
dict	Create dictionary with capacity for *int* elements
dictstack	Copy dictionary stack into *array*
end	Pop dictionary stack
errordict	Error handler dictionary
forall	Execute *proc* for each element of *dict*
get	Get value associated with *key* in *dict*
known	Test whether *key* is in *dict*
length	Number of key-value pairs in *dict*
load	Search dictionary stack for *key* and return associated *value*

maxlength	Current capacity of *dict*
put	Associate *key* with *value* in *dict*
store	Replace topmost definition of *key*
systemdict	System dictionary
userdict	Writable dictionary in local VM
where	Find dictionary in which *key* is defined

Control operators

Operator	**Function**
countexecstack	Count elements on exec stack
exec	Execute arbitrary object
execstack	Copy exec stack into *array*
exit	Exit innermost active loop
for	Execute *proc* with values form *start* by steps of *increment* to *finish*
if	Execute *proc* if *bool* is true
ifelse	Execute $proc_1$ if *bool* is true, $proc_2$ if *bool* is false
loop	Execute *proc* an indefinite number of times
quit	Terminate interpreter
repeat	Execute *proc int* times
start	Executed at interpreter startup
stop	Terminate **stopped** context
stopped	Establish context for catching **stop**

Type and attribute operators

Operator	**Function**
cvi	Convert to integer
cvlit	Make object be literal
cvn	Convert to name
cvr	Convert to real
cvs	Convert to string
cvrs	Convert to string with radix
cvx	Make object be executable
executeonly	Reduce access to execute-only
noaccess	Disallow any access
rcheck	Test read access
readonly	Reduce access to read-only
type	Return name identifying the type of *any*
wcheck	Test write access
xcheck	Test executable attribute

Font operators

Operator	Function
ashow	Add (*x*, *y*) to width of each character while showing *string*
awidthshow	Combine effects of **ashow** and **widthshow**
currentfont	Return current font dictionary
definefont	Register *font* as a font dictionary
findfont	Return font dictionary identified by *key*
FontDirectory	Dictionary of font dictionaries
kshow	Execute *proc* between characters shown from *string*
makefont	Transform $font_1$ by *matrix* to produce new $font_2$
scalefont	Scale $font_1$ by *scale* to produce new $font_2$
setfont	Set font dictionary in graphics state
show	Paint characters of *string* on page
StandardEncoding	Standard font encoding vector
stringwidth	Width of *string* in current font
widthshow	Add (*x*, *y*) to width of *char* while showing *string*

Font cache operators

Operator	Function
cachestatus	Return font cache status and parameters
currentcacheparams	Return current font cache parameters
setcachedevice	Declare cached character metrics
setcachelimit	Set maximum bytes in cached character
setcacheparams	Change font cache parameters
setcharwidth	Declare uncached character metrics

File operators

Operator	Function
=	Write text representation of *any* to standard output file
==	Write syntactic representation of *any* to standard output file
bytesavailable	Number of bytes available to read
closefile	Close *file*
currentfile	Return file currently being executed
echo	Turn on/off echoing
file	Open file identified by $string_1$ with access $string_2$

flush	Send buffered data to standard output file
flushfile	Send buffered data or read to EOF
print	Write *string* to standard output file
prompt	Executed when ready for interactive input
pstack	Print stack non-destructively using ==
read	Read one character from *file*
readhexstring	Read hex from *file* into string
readline	Read line from *file* into string
readstring	Read string from *file*
resetfile	Discard buffered characters
run	Execute contents of named file
stack	Print stack non-destructively using =
status	Return status of *file*
token	Read token from *file*
write	Write one character to *file*
writehexstring	Write *string* to *file* as hex
writestring	Write *string* to *file*

Virtual memory operators

Operator	**Function**
restore	Restore VM snapshot
save	Create VM snapshot
vmstatus	Report VM status

Miscellaneous operators

Operator	**Function**
bind	Replace operator names in *proc* by operators
currentdash	Return current dash pattern
currentflat	Return current flatness
currentgray	Return current color as gray value
currenthsbcolor	Return current color as hue, saturation, brightness
currentlinecap	Return current line cap
currentlinejoin	Return current line join
currentlinewidth	Return current line width
currentmiterlimit	Return current miter limit
currentrgbcolor	Return current color as red, green, blue
currentscreen	Return current gray halftone screen
currenttransfer	Return current gray transfer function
executive	Invoke interactive executive

grestore	Pop graphics state
grestoreall	Pop to bottommost graphics state
gsave	Push graphics state
initgraphics	Reset graphics state parameters
null	Push *null* on operand stack
setdash	Set dash pattern for stroking
setflat	Set flatness tolerance
setgray	Set color to specified gray value
sethsbcolor	Set color to specified hue, saturation, brightness
setlinecap	Set shape of line ends for stroke
setlinejoin	Set shape of corners for stroke
setlinewidth	Set line width
setmiterlimit	Set miter length limit
setrgbcolor	Set color to specified red, green, blue
setscreen	Set gray halftone screen
settransfer	Set gray transfer function
usertime	Return execution time in milliseconds
version	Interpreter version

Coordinate operators

Operator	**Function**
concat	Replace CTM by *matrix* × CTM
concatmatrix	Fill $matrix_3$ with $matrix_1 \times matrix_2$
currentmatrix	Fill *matrix* with CTM
defaultmatrix	Fill *matrix* with device default matrix
dtransform	Transform distance (dx_1, dy_1) by CTM or *matrix*
identmatrix	Fill *matrix* with identity transform
idtransform	Inverse transform distance (dx_1, dy_1) by CTM or *matrix*
initmatrix	Set CTM to device default
invertmatrix	Fill $matrix_2$ with inverse of $matrix_1$
itransform	Inverse transform (x_1, y_1) by CTM or *matrix*
matrix	Create identity matrix
rotate	Rotate user space or define rotation by *angle* degrees
scale	Scale user space or define scaling by x and y
setmatrix	Replace CTM by *matrix*
transform	Transform (x_1, y_1) by CTM or *matrix*
translate	Translate user space or define translation by (x, y)

Device set-up operators

Operator	Function
copypage	Transmit current page
framedevice	Install frame buffer device
nulldevice	Install no-output device
showpage	Transmit and reset current page

Star original operators

Operator	Function
a4tray	Look for A4 size paper tray
b5tray	Look for B5 size paper tray
c5envelope	Establish imaging area to C5 size envelope
c5envelopetray	Look for C5 size envelope tray
com10envelope	Establish imaging area to COM-10 size envelope
com10envelopetray	Look for COM-10 size envelope tray
dlenvelope	Establish imaging area to DL size envelope
dlenvelopetray	Look for DL size envelope tray
dojamrecovery	Indicate whether jam recovery is on or off
dorep	Indicate whether REP is on or off
executivepage	Establish imaging area to executive size
executivetray	Look for Executive size paper tray
findtray	Find the specific paper tray
legaltray	Look for Legal size paper tray
lettertray	Look for Letter size paper tray
monarcenvelope	Establish imaging area to Monarch size envelope
monarcenvelopetray	Look for Monarch size envelope tray
papertray	Return int indicating the current tray
ppapersize	Ask the paper size of the specific paper tray
setdojamrecovery	Turn jam recovery on/off
setdorep	Turn REP on/off
setemulation	Switch the emulation
setpapertray	Establish which input tray and set the imaging area
settray	Set tray which paper will be fed
traysup	Check whether the specified paper tray is supplied

Errors

Operator	Function
dictfull	No more room in dictionary
dictstackoverflow	Too many **begin**s
dictstackunderflow	Too many **end**s
execstackoverflow	Exec nesting too deep
handleerror	Called to report error information
interrupt	External interrupt request
invalidaccess	Attempt to violate access attribute
invalidexit	**exit** not in loop
invalidfileaccess	Unacceptable access string
invalidfont	Invalid font name or dictionary
invalidrestore	Improper **restore**
ioerror	Input/output error occurred
limitcheck	Implementation limit exceeded
nocurrentpoint	Current point is undefined
rangecheck	Operand out of bounds
stackoverflow	Operand stack overflow
stackunderflow	Operand stack underflow
syntaxerror	Language syntax error
timeout	Time limit exceeded
typecheck	Operand of wrong type
undefined	Name not known
undefinedfilename	File not found
undefinedresult	Over/underflow or meaningless result
unmatchedmark	Expected mark not on stack
unregistered	Internal error
VMerror	VM exhausted

9.5 CHARACTER SET TABLES

ISO 60: Norwegian

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Æ 91	k 107	æ 123
C	<FF> 12	28	, 44	< 60	L 76	Ø 92	l 108	ø 124
D	<CR> 13	29	- 45	= 61	M 77	Å 93	m 109	å 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	¯ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

Roman Extension

	0	1	2	3	4	5	6	7
0	0	16	32	— 48	â 64	Å 80	Á 96	Þ 112
1	1	17	À 33	Ý 49	ê 65	Î 81	Ã 97	þ 113
2	2	18	Â 34	ý 50	ô 66	Ø 82	ã 98	· 114
3	3	19	È 35	° 51	û 67	Æ 83	Đ 99	µ 115
4	4	20	Ê 36	Ç 52	á 68	å 84	ð 100	¶ 116
5	5	21	Ë 37	ç 53	é 69	í 85	Í 101	¾ 117
6	6	22	Î 38	Ñ 54	ó 70	ø 86	Ì 102	‗ 118
7	7	23	Ï 39	ñ 55	ú 71	æ 87	Ó 103	¼ 119
8	<BS> 8	24	´ 40	¡ 56	à 72	Ä 88	Ò 104	½ 120
9	<HT> 9	25	` 41	¿ 57	è 73	ì 89	Õ 105	ª 121
A	<LF> 10	26	^ 42	¤ 58	ò 74	Ö 90	õ 106	º 122
B	11	<ESC> 27	¨ 43	£ 59	ù 75	Ü 91	Š 107	« 123
C	<FF> 12	28	~ 44	¥ 60	ä 76	É 92	š 108	■ 124
D	<CR> 13	29	Ù 45	§ 61	ë 77	ï 93	Ú 109	» 125
E	<SO> 14	30	Û 46	ƒ 62	ö 78	ß 94	Ÿ 110	± 126
F	<SI> 15	31	£ 47	ç 63	ü 79	Ô 95	ÿ 111	127

ISO 25: French

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	à 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	£ 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	° 91	k 107	é 123
C	<FF> 12	28	, 44	< 60	L 76	ç 92	l 108	ù 124
D	<CR> 13	29	- 45	= 61	M 77	§ 93	m 109	è 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	¨ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

HP German

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	§ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	£ 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Ä 91	k 107	ä 123
C	<FF> 12	28	, 44	< 60	L 76	Ö 92	l 108	ö 124
D	<CR> 13	29	- 45	= 61	M 77	Ü 93	m 109	ü 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	ß 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 15: Italian

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	§ 64	P 80	ù 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	£ 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	° 91	k 107	à 123
C	<FF> 12	28	, 44	< 60	L 76	ç 92	l 108	ò 124
D	<CR> 13	29	- 45	= 61	M 77	é 93	m 109	è 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	ì 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

JIS ASCII

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	¥ 92	l 108	| 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	‾ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ECMA-94 Latin 1

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	\ 92	l 108	| 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ECMA-94 Latin 1

	8	9	A	B	C	D	E	F
0	128	144	160	° 176	À 192	Đ 208	à 224	ð 240
1	129	145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	130	146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	131	147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	132	148	¤ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	133	149	¥ 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	134	150	¦ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	135	151	§ 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	136	152	¨ 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	137	153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	138	154	ª 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	139	155	« 171	» 187	Ë 203	Û 219	ë 235	û 251
C	140	156	¬ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	141	157	173	½ 189	Í 205	Ý 221	í 237	ý 253
E	142	158	® 174	¾ 190	Î 206	Þ 222	î 238	þ 254
F	143	159	¯ 175	¿ 191	Ï 207	ß 223	ï 239	ÿ 255

ISO 11: Swedish

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	É 64	P 80	é 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	¤ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Ä 91	k 107	ä 123
C	<FF> 12	28	, 44	< 60	L 76	Ö 92	l 108	ö 124
D	<CR> 13	29	- 45	= 61	M 77	Å 93	m 109	å 125
E	<SO> 14	30	. 46	> 62	N 78	Ü 94	n 110	ü 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

US-ASCII

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	\ 92	l 108	| 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 61: Norwegian

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	§ 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Æ 91	k 107	æ 123
C	<FF> 12	28	, 44	< 60	L 76	Ø 92	l 108	ø 124
D	<CR> 13	29	- 45	= 61	M 77	Å 93	m 109	å 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	| 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 4: UK

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	£ 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	\ 92	l 108	| 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 69: French

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	à 64	P 80	μ 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	£ 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	° 91	k 107	é 123
C	<FF> 12	28	, 44	< 60	L 76	ç 92	l 108	ù 124
D	<CR> 13	29	- 45	= 61	M 77	§ 93	m 109	è 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	¨ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 21: German

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	§ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Ä 91	k 107	ä 123
C	<FF> 12	28	, 44	< 60	L 76	Ö 92	l 108	ö 124
D	<CR> 13	29	- 45	= 61	M 77	Ü 93	m 109	ü 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	ß 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

HP Spanish

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	¡ 91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	Ñ 92	l 108	ñ 124
D	<CR> 13	29	- 45	= 61	M 77	¿ 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	° 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 57: Chinese

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	¥ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	\ 92	l 108	| 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	‾ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 17: Spanish

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	§ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	£ 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	¡ 91	k 107	° 123
C	<FF> 12	28	, 44	< 60	L 76	Ñ 92	l 108	ñ 124
D	<CR> 13	29	- 45	= 61	M 77	¿ 93	m 109	ç 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 2: IRV

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	¤ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	\ 92	l 108	| 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	¯ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 10: Swedish

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	¤ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Ä 91	k 107	ä 123
C	<FF> 12	28	, 44	< 60	L 76	Ö 92	l 108	ö 124
D	<CR> 13	29	- 45	= 61	M 77	Å 93	m 109	å 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 16: Portuguese

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	§ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Ã 91	k 107	ã 123
C	<FF> 12	28	, 44	< 60	L 76	Ç 92	l 108	ç 124
D	<CR> 13	29	- 45	= 61	M 77	Õ 93	m 109	õ 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	° 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 84: Portuguese

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	´ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	Ã 91	k 107	ã 123
C	<FF> 12	28	, 44	< 60	L 76	Ç 92	l 108	ç 124
D	<CR> 13	29	- 45	= 61	M 77	Õ 93	m 109	õ 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

ISO 85: Spanish

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	· 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	¡ 91	k 107	´ 123
C	<FF> 12	28	, 44	< 60	L 76	Ñ 92	l 108	ñ 124
D	<CR> 13	29	- 45	= 61	M 77	Ç 93	m 109	ç 125
E	<SO> 14	30	. 46	> 62	N 78	¿ 94	n 110	¨ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

Roman-8

	0	1	2	3	4	5	6	7
0	0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	20	$ 36	4 52	D 68	T 84	d 100	t 116
5	5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	\ 92	l 108	| 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

Roman-8

	8	9	A	B	C	D	E	F
0	128	144	160	¯ 176	â 192	Å 208	Á 224	Þ 240
1	129	145	À 161	Ý 177	ê 193	î 209	Ã 225	þ 241
2	130	146	Â 162	ý 178	ô 194	Ø 210	ã 226	· 242
3	131	147	È 163	° 179	û 195	Æ 211	Đ 227	µ 243
4	132	148	Ê 164	Ç 180	á 196	å 212	ð 228	¶ 244
5	133	149	Ë 165	ç 181	é 197	í 213	Í 229	¾ 245
6	134	150	Î 166	Ñ 182	ó 198	ø 214	Ì 230	‗ 246
7	135	151	Ï 167	ñ 183	ú 199	æ 215	Ó 231	¼ 247
8	136	152	´ 168	¡ 184	à 200	Ä 216	Ò 232	½ 248
9	137	153	` 169	¿ 185	è 201	ì 217	Õ 233	ª 249
A	138	154	^ 170	¤ 186	ò 202	Ö 218	õ 234	º 250
B	139	155	¨ 171	£ 187	ù 203	Ü 219	Š 235	« 251
C	140	156	~ 172	¥ 188	ä 204	É 220	š 236	■ 252
D	141	157	Ù 173	§ 189	ë 205	ï 221	Ú 237	» 253
E	142	158	Û 174	ƒ 190	ö 206	ß 222	Ÿ 238	± 254
F	143	159	£ 175	ç 191	ü 207	Ô 223	ÿ 239	255

IBM-PC(US)

	0	1	2	3	4	5	6	7
0	0	0 16	32	0 48	@ 64	P 80	` 96	p 112
1	! 1	1 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	" 2	2 18	" 34	2 50	B 66	R 82	b 98	r 114
3	# 3	3 19	# 35	3 51	C 67	S 83	c 99	s 115
4	$ 4	4 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	% 5	5 21	% 37	5 53	E 69	U 85	e 101	u 117
6	& 6	6 22	& 38	6 54	F 70	V 86	f 102	v 118
7	' 7	7 23	' 39	7 55	G 71	W 87	g 103	w 119
8	(8	8 24	(40	8 56	H 72	X 88	h 104	x 120
9	) 9	9 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	* 10	: 26	* 42	: 58	J 74	Z 90	j 106	z 122
B	+ 11	; 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	, 12	< 28	, 44	< 60	L 76	\ 92	l 108	| 124
D	- 13	= 29	- 45	= 61	M 77	] 93	m 109	} 125
E	. 14	> 30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	/ 15	? 31	/ 47	? 63	O 79	_ 95	o 111	⌂ 127

IBM-PC(US)

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	⣿ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

IBM-PC(Denmark/Norway)

	0	1	2	3	4	5	6	7
0	0	0 16	32	0 48	@ 64	P 80	` 96	p 112
1	! 1	1 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	" 2	2 18	" 34	2 50	B 66	R 82	b 98	r 114
3	# 3	3 19	# 35	3 51	C 67	S 83	c 99	s 115
4	$ 4	4 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	% 5	5 21	% 37	5 53	E 69	U 85	e 101	u 117
6	& 6	6 22	& 38	6 54	F 70	V 86	f 102	v 118
7	' 7	7 23	' 39	7 55	G 71	W 87	g 103	w 119
8	(8	8 24	(40	8 56	H 72	X 88	h 104	x 120
9	) 9	9 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	* 10	: 26	* 42	: 58	J 74	Z 90	j 106	z 122
B	+ 11	; 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	, 12	< 28	, 44	< 60	L 76	\ 92	l 108	| 124
D	- 13	= 29	- 45	= 61	M 77	] 93	m 109	} 125
E	. 14	> 30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	/ 15	? 31	/ 47	? 63	O 79	_ 95	o 111	⌂ 127

IBM-PC(Denmark/Norway)

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	⣿ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	õ 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	Õ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	ã 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	Ã 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	ø 155	ℓ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	ℏ 172	╝ 188	╠ 204	■ 220	∞ 236	n 252
D	ì 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	2 253
E	Ä 142	₧ 158	3 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	¤ 175	┐ 191	╧ 207	▀ 223	∩ 239	255

PC-850

	0	1	2	3	4	5	6	7
0	0	0 16	32	0 48	@ 64	P 80	` 96	p 112
1	! 1	1 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	" 2	2 18	" 34	2 50	B 66	R 82	b 98	r 114
3	# 3	3 19	# 35	3 51	C 67	S 83	c 99	s 115
4	$ 4	4 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	% 5	5 21	% 37	5 53	E 69	U 85	e 101	u 117
6	& 6	6 22	& 38	6 54	F 70	V 86	f 102	v 118
7	' 7	7 23	' 39	7 55	G 71	W 87	g 103	w 119
8	(8	8 24	(40	8 56	H 72	X 88	h 104	x 120
9	) 9	9 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	* 10	: 26	* 42	: 58	J 74	Z 90	j 106	z 122
B	+ 11	; 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	, 12	< 28	, 44	< 60	L 76	\ 92	l 108	| 124
D	- 13	= 29	- 45	= 61	M 77	] 93	m 109	} 125
E	. 14	> 30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	/ 15	? 31	/ 47	? 63	O 79	_ 95	o 111	⌂ 127

PC-850

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	⣿ 176	└ 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	Đ 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	â 131	ô 147	ú 163	| 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▌ 223	´ 239	255

9.6 RESIDENT FONT SAMPLES

9.6.1 PCL5 Fonts

Courier 12-point (10 cpi)	!"#$%&'()*+,-./0123456789: ;<=>?@ABCDEFGHIJKLMNOPQRST UVWXYZ[\]^_`abcdefghijklmn opqrstuvwxyz{|}~▒
Courier Bold 12-point (10 cpi)	**!"#$%&'()*+,-./0123456789: ;<=>?@ABCDEFGHIJKLMNOPQRST UVWXYZ[\]^_`abcdefghijklmn opqrstuvwxyz{|}~▒**
Courier Italic 12-point (10 cpi)	*!"#$%&'()*+,-./0123456789: ;<=>?@ABCDEFGHIJKLMNOPQRST UVWXYZ[\]^_`abcdefghijklmn opqrstuvwxyz{|}~▒*
Courier 10-point (12 cpi)	!"#$%&'()*+,-./0123456789:;<=>? @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ _`abcdefghijklmnopqrstuvwxyz{|} ~▒
Courier Bold 10-point (12 cpi)	**!"#$%&'()*+,-./0123456789:;<=>? @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ _`abcdefghijklmnopqrstuvwxyz{|} ~▒**
Courier Italic 10-point (12 cpi)	*!"#$%&'()*+,-./0123456789:;<=>? @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ _`abcdefghijklmnopqrstuvwxyz{|} ~▒*
Line Printer 8.5-point (16.6 cpi)	!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJK LMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv wxyz{|}~▒
Univers Medium	!"#$%&'()* +,-./0123456789:;< = >? @ABCDEFGHIJKLMNOPQRSTUVWXYZ [\]^_'abcdefghijklmnopqrstuvwxyz{|}~ ▒

Univers Medium Italic	*!"#$%&'()*+,-./0123456789:;<=>?* *@ABCDEFGHIJKLMNOPQRSTUVWXYZ* *[\]^_'abcdefghijklmnopqrstuvwxyz{|}~*
Univers Bold	**!"#$%&'()*+,-./0123456789:;<=>?** **@ABCDEFGHIJKLMNOPQRSTUVWXYZ** **[\]^_'abcdefghijklmnopqrstuvwxyz{|}~**
Univers Bold Italic	***!"#$%&'()*+,-./0123456789:;<=>?*** ***@ABCDEFGHIJKLMNOPQRSTUVWXYZ*** ***[\]^_'abcdefghijklmnopqrstuvwxyz{|}~***
CG Times	!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_‘ abcdefghijklmnopqrstuvwxyz{|}~
CG Times Italic	*!"#$%&'()*+,-./0123456789:;<=>?@AB* *CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_‘ab* *cdefghijklmnopqrstuvwxyz{|}~*
CG Times Bold	**!"#$%&'()*+,-./0123456789:;<=>?@AB** **CDEFGHIJKLMNOPQRSTUVWXYZ[\]^** **_‘abcdefghijklmnopqrstuvwxyz{|}~**
CG Times Bold Italic	***!"#$%&'()*+,-./0123456789:;<=>?@AB*** ***CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_‘*** ***abcdefghijklmnopqrstuvwxyz{|}~***

9.6.2 TrueImage Fonts

Arial	!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^ _'abcdefghijklmnopqrstuvwxyz{|}~
Arial Bold	**!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^ _'abcdefghijklmnopqrstuvwxyz{|}~**
Arial Bold Oblique	***!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^ _'abcdefghijklmnopqrstuvwxyz{|}~***
Arial Oblique	*!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^ _'abcdefghijklmnopqrstuvwxyz{|}~*
Arial Narrow	!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI JKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnop qrstuvwxyz{|}~
Arial Narrow Bold	**!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG HIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijkl mnopqrstuvwxyz{|}~**
Arial Narrow Bold Oblique	***!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFG HIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijkl mnopqrstuvwxyz{|}~***
Arial Narrow Oblique	*!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHI JKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnop qrstuvwxyz{|}~*
Century Schoolbook Bold	**!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXY Z[\]^_'abcdefghijklmnopqrstuvwx yz{|}~**
Century Schoolbook Bold Italic	***!"#$%&'()*+,-./0123456789:;<=>?@A BCDEFGHIJKLMNOPQRSTUVWX YZ[\]^_'abcdefghijklmnopqrstuvw xyz{|}~***

Century Schoolbook Italic	*!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~*
Century Schoolbook Roman	!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{|}~
Courier	!"#$%&'()*+,-./0123456789:;< =>?@ABCDEFGHIJKLMNOPQRSTUVWXY Z[\]^_'abcdefghijklmnopqrstuv wxyz{|}~
Courier Bold	**!"#$%&'()*+,-./0123456789:;< =>?@ABCDEFGHIJKLMNOPQRSTUVWXY Z[\]^_'abcdefghijklmnopqrstuv wxyz{|}~**
Courier Bold Oblique	***!"#$%&'()*+,-./0123456789:;< =>?@ABCDEFGHIJKLMNOPQRSTUVWXY Z[\]^_'abcdefghijklmnopqrstuv wxyz{|}~***
Courier Oblique	*!"#$%&'()*+,-./0123456789:;< =>?@ABCDEFGHIJKLMNOPQRSTUVWXY Z[\]^_'abcdefghijklmnopqrstuv wxyz{|}~*
ITC Avant Garde Gothic Book	!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ 'abcdefghijklmnopqrstuvwxyz{|}~
ITC Avant Garde Gothic Book Oblique	*!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ 'abcdefghijklmnopqrstuvwxyz{|}~*
ITC Avant Garde Gothic Demi	**!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_' abcdefghijklmnopqrstuvwxyz{|}~**
ITC Avant Garde Gothic Demi Oblique	***!"#$%&'()*+,-./0123456789:;<=>?@AB CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_' abcdefghijklmnopqrstuvwxyz{|}~***

ITC Bookman Demi	!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
ITC Bookman Demi Italic	*!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~*
ITC Bookman Light	!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
ITC Bookman Light Italic	*!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~*
ITC Zapf Chancery Medium Italic	*!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~*
ITC Zapf Dingbats	✂✁✃✄☎✆✇✈✉☞✌✍✎✏✐✑✒✓✔✕✖✗✘✙✚✛✜✢✣✤✥✦✧★✩✪✫✬✭✮✯✰✱✲✳✴✵✶✷✸✹✺✻✼✽✾✿❀❁❂❃❄❅❆❇❈❉❊❋●○■□❑❒▲▼◆❖◗❙❚❛❜❝❞❡❢❣❤❥❦❧
Symbol	!∀#∃%&∋()*+,−./0123456789:;<=>?≅ΑΒΧΔΕΦΓΗΙϑΚΛΜΝΟΠΘΡΣΤΥςΩΞΨΖ[∴]⊥_‾αβχδεφγηιφκλμνοπθρστυϖωξψζ{|}~
Times New Roman	!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
Times New Roman Bold	**!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~**
Times New Roman Bold Italic	***!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~***

Times New Roman Italic	*!"#$%& '()*+,-./0123456789:;<=>?@ABC DEFGHIJKLMNOPQRSTUVWXYZ[\]^_`ab cdefghijklmnopqrstuvwxyz{|}~*
Zapf Calligraphic Bold	**!"#$%&'()*+,-./0123456789:;<=>?@ABC DEFGHIJKLMNOPQRSTUVWXYZ[\] ^_'abcdefghijklmnopqrstuvwxyz{|}~**
Zapf Calligraphic Bold Italic	***!"#$%&'()*+,-./0123456789:;<=>?@ABC DEFGHIJKLMNOPQRSTUVWXYZ[\]^ _'abcdefghijklmnopqrstuvwxyz{|}~***
Zapf Calligraphic Italic	*!"#$%&'()*+,-./0123456789:;<=>?@ABC DEFGHIJKLMNOPQRSTUVWXYZ[\]^_ 'abcdefghijklmnopqrstuvwxyz{|}~*
Zapf Calligraphic Roman	!"#$%&'()*+,-./0123456789:;<=>?@ABC DEFGHIJKLMNOPQRSTUVWXYZ[\]^ _'abcdefghijklmnopqrstuvwxyz{|}~

Glossary

ASCII (as' kee) — a standardized and commonly accepted numerical code that represents letters, numbers, and symbols, as well as command sets. ASCII stands for *American Standard Code for Information Interchange.*

Baud— a measure of the speed at which information is transmitted. The baud rate, which is set for serial transmissions, is approximately the number of characters transmitted per second multiplied by 10.

Bitmap fonts— made of tiny dot-by-dot patterns in pre-defined sizes. Bitmap fonts have a fixed point size, pitch and symbol set attributes.

Byte — a series of 8 bits that represents one character.

Centronics interface — a standard wiring configuration for parallel data transmission. *Centronics* is often used as a synonym for the parallel standard developed by Centronics Inc.

Character Set — the complete set of characters available in a font.

Data Bits — the number of bits in a transmitted byte that actually contains data.

EEPROM — Electrically Erasable Programmable Read Only Memory. It has an internal switch to permit a user to erase the contents and write new contents into it by means of electrical signals.

EP-40XA Cartridge — A disposable type of process cartridge which contains the photosensitive drum and toner.

Emulation — behaving like something else. The Star LS-5EX can emulate, or behave like the HP LaserJet III laser printer, and the Star LS-5TT can emulate the operation of the Apple LaserWriter NTX, a PostScript version, and the HP LaserJet III.

Expansion RAM board — An available option that is easily attached to the Star LS-5 Series Printer to expand its RAM.

Fixing assembly — The assembly used to fix the toner on to the paper or other material using heat and pressure in printing process. It is located inside the printer and it gets extremely hot during the operation.

Font — a set of letters, numbers, and symbols of the same typeface design.

Font cartridge — Font cartridges contain fonts which can supplement the available resident fonts of the printer to increase the variety of typefaces.

Handshaking — in data communication, the automatic acknowledging by the receiving device of information that has been sent to it, either by signals and the interface ("hard") or by software control ("soft").

Hex dump — conversion by the printer of ASCII symbols into their hexadecimal (base 16) equivalent. This is useful for programmers or other users who want to troubleshoot the communications between the computer and the printer.

HMI (Horizontal Motion Index) — refers to dot spacing in the smallest increment that can be made in the horizontal or *x* axis.

Interface — a hardware plug that allows cable connections of two devices. For instance, a cable from a computer parallel port to a printers parallel port.

Landscape — printing on paper across its wider dimension, such as a spreadsheet that is 11 in. wide and 8.5 in. high; landscape pictures are usually wider than they are tall.

NV RAM — NV(Non-volatile) Random Access Memory is the permanent storage by the Star LS-5 Series Printer of settings programmed from the front panel, even when the power is turned off. When the printer is turned on again, these settings become the current settings.

Parallel — a communications interface that sends or receives 8 bits of information plus control signals at a time.

Parity — a bit in a serial information that allows a computer and printer to automatically check for errors in transmission.

Pitch — the width of a typeface measured in characters per inch.

Point — the height of a type font, measured in points, or 1/72 of an inch.

Portrait — printing on paper across its narrower dimension, such as a letter on paper that is 8.5 in. wide and 11 in. high; portrait pictures are usually taller than they are wide.

Proportional type — a typeface in which some letters take up more room on a printed line than others, such as *W* taking more space than *I*. The spacing of the letters is also intended to enhance the esthetic quality of the printed page.

RAM — Random Access Memory, or memory that can be used to store information temporarily, such as text or printing configurations. RAM-stored information is erased when the power is turned off.

ROM — Read Only Memory, or memory in which information can be stored permanently, whether the power is on or off.

RS-232 — a wiring configuration for sending and receiving serial transmissions, including data and acknowledgments between sending and receiving equipment ("handshaking").

Scalable fonts — created within the printer on a character-by-character basis ensuring high speed and print quality. In virtually limitless sizes, fonts can be scaled from 3 points to 999.75 points in quarter-point increments.

Serial — a communications interface that sends or receives 1 bit of information at a time at a specified baud rate.

Stop Bit — 1 or 2 bits used by the computer for the timing of a transmission of information.

Stroke weight — the intensity of a printed character, such as *light*, *medium*, or *bold*. Normal printing is medium weight.

Symbol Set — the entire list of ASCII letters, numbers, and symbols used with a particular language, such as English or Spanish.

VMI (Vertical Motion Index) — refers to line spacing, the smallest increment that can be made in the vertical or *y* axis.

MEMO

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